SOLVING FOR X, A FEW OTHER FRIENDS FROM HIGH SCHOOL, AND AN INTRODUCTION TO BUSINESS CONCEPTS FOR LAW STUDENTS

Theresa A. Gabaldon Christopher L. Sagers

SOLVING FOR X, A FEW OTHER FRIENDS FROM HIGH SCHOOL, AND AN INTRODUCTION TO BUSINESS **CONCEPTS FOR LAW STUDENTS**

Table of Contents

I.	Basic Math Concepts	4
	Basic Operations with Whole Numbers	6
	Signs and Operations with Negative Numbers	7
	Fractions, Decimals, and Percentages	8
	Exponents	11
	Solving One-Variable Equations	12
II.	Accounting and Financial Statements	13
	Accounting Conventions and an Introduction to Financial Statements 11	
	 Double-Entry Bookkeeping and the "Accounting Equation" Introduction 10 the Balance Sheet and Income Statement T-Accounts and Day-to-Day Bookkeeping Accounts in General The Relationship of Assets and Expenses, Accrual and the Matching Principle, and the Introduction of Contra Accounts Re-Cap More on GAAP, the Distinction between Cash and Accrual Accounting, and the Challenges of Historic Cost Accounting Introduction to the Statement of Cash Flows Sample Financial Statements with Additional Details The Balance Sheet The Income Statement (or "Profit and Loss" Statement) The Statement of Cash Flows 	14 17 19 21 22 24 26 29 31 31 34 38
	Footnotes and MD&A	41
	Financial Ratios and Other Calculations: Diagnostic Tools U Financial Statement Numbers	Jsing 44

	Liquidity and Activity	44
	Profitability and Performance	45
	Ratios and Other Calculations Involving Cash Flows	47
III.	Finance	48
	Valuation and the Time-Value of Money	48
	Money and Market Value	48
	The Basics of Book Value, Return, and Risk	49
	The Time Value of Money	51
	Other Valuation Tools	53
	Distributions and Valuation	54
	Capital Structure	54
	Leverage	54
	Taxes and Other Warts	57
IV.	Tax Considerations	57
	In General	57
	Corporate Tax Considerations	58
	Unincorporated Entities	60

SOLVING FOR X, A FEW OTHER FRIENDS FROM HIGH SCHOOL, AND AN INTRODUCTION TO BUSINESS CONCEPTS FOR LAW STUDENTS

In this short module we hope to give you enough background material to prepare you for business concepts that may come up in business organization courses, even if you've never learned about them before. Much of it will help you understand the reading assignments in the main casebook, and some of it is somewhat more advanced material that your professor also might assign. In some instances, some of the boxed features in the casebook directly invite you to consult the online supplement about one or more of the matters considered in this module.

We focus on four big categories:

- Basic math concepts,
- Accounting and financial statements,
- Finance, and
- Tax considerations relevant to business planning.

I. Basic Math Concepts

There is a popular perception that lawyers and law students are innumerate (that is, the math equivalent of illiterate). There are jokes on the subject – none of them particularly funny – as well as a slew of anecdotal illustrations of legal calamities involving basic mathematical errors by lawyers or judges. There is, however and happily, at least one study negating the truth of the perception and suggesting that, no matter how lawyers and law students think about themselves, they are not, as a group, objectively innumerate¹ This was determined using a standard, three-question test for numeracy which, given the irresistible allure of do-it-yourself testing, is set out below (with answers in the accompanying footnote):

(1) Imagine that you flip a fair coin 1,000 times. What is your best guess about how many times the coin will come up heads?

(2) In the Big Bucks Lottery, the chance of winning a \$10 prize is 1%. What is your best guess about how many people would win a \$10 prize if 1,000 people each buy a single lottery ticket?

¹See Arden Rowell & Jessica Bregant, *Numeracy and Legal Decision Making*, 46 ARIZ. ST. L.J. 191, 221–22 (2014) (noting that data suggests that attorneys are better at numeracy when compared to the general public).

(3) In Acme Publishing Sweepstakes, the chance of winning a car is 1 in 1,000. What percent of tickets to the sweepstakes win a car?²

When this test was first administered to takers who might be described as "the general public," about fifty percent of the respondents correctly answered the first two questions; only twenty percent were able to correctly answer the third. Thirty percent were unable to answer a single question correctly and only sixteen percent got all three right. By contrast, when the same test was administered to University of Illinois law students, slightly over eighty-five percent answered the first two questions correctly; that happy result fell to sixty-nine percent for the third question. Fifty-seven percent got all three right and slightly under three percent got all the questions wrong. The law student outcomes did not significantly deviate from those achieved by a test population comprised of highly-educated non-lawyers, leading the authors of the study to conclude that education level is correlated with numeracy, whereas the choice to pursue a legal career is not.

Of course, there is no reason to think that students opt to attend law school – or enroll in Business Organizations – because they are especially eager to practice their math skills. The fact of the matter, though, is that the life of a transactional lawyer is, by and large, a numerate life. Indeed, since transactional lawyering almost inevitably involves measured quantities of money, there really is no getting away from math. A fairly recent study revealed that the largest employers of the graduates of Harvard Law School (a/k/a "Big Law") advise would-be corporate/transactional lawyers that they need to become proficient in accounting and financial statement analysis, as well as in corporate finance (both of which require modest math skills).³ Moreover, Michael A. Woronoff, a practitioner and adjunct professor of law at UCLA, has offered what he refers to as a "quite obviously incomplete" list of tasks "commonly performed by transactional lawyers, each of which requires some level of numeracy."⁴ The tasks he identified include (with many other examples) the negotiation and monitoring of anti-dilution provisions, earn-out conditions, purchase price adjustments, subordination provisions, exchange ratios, and financial covenants. Other obvious illustrations include advising on and negotiating partnership profit-sharing arrangements, consulting on the legitimacy of dividends, and (especially in California, where the subject is taken particularly seriously) explaining how corporate cumulative voting works. Some of these are matters dealt with in the text of Business Organizations; some are not.

The purpose of this particular section of the *Solving for X* module is to refresh you on the math skills needed either to perform the tasks Professor Woronoff listed or to move on to develop

² The test was developed by Lisa Schwartz, Steven Woloshin, William Black & Gilbert Welch, *The Role of Numeracy in Understanding the Benefit of Screening Mammography*, 127 ANNALS INTERNAL MED. 966, 1038 (1997). The answers are, respectively, 500; 10; and .1%.

³ John Coates et al., *What Courses Should Law Students Take? Harvard's Largest Employers Weigh In* 1 (Harvard Pub. Law, Working Paper No. 14-20, 2014), available at

http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID2397317_code1465.pdf?abstractid=2397317

[&]amp;mirid=1. The referenced subjects also were regarded as important for litigators. Id.

⁴ Joan MacLeod Heminway, Michael A. Woronoff & Lyman P.Q. Johnson, *Innovative Transactional Pedagogies*, 12 TRANSACTIONS: TENN. J. BUS. L. 243, 253 (2011).

the facility in financial statement analysis and understanding of corporate finance suggested by the Harvard study. Later portions of the module will actually introduce you to financial statements and corporate finance concepts, as well as to basic tax principles useful to general business practitioners.

Do be reassured that what we are talking about in this section really is "refreshing." The math skills required are no more than those you most certainly learned in high school, if not before. (Be further reassured that we are not talking about calculus, solving for multiple variables, working with irrational numbers, or anything of the sort.) Better yet, it is perfectly permissible to use a calculator.

On the flip side, please don't be offended by just how basic some of the following may seem. For instance, we do review the basic operations for purposes of reminding you of some vocabulary that may have faded. Note, though, that we do not purport to review how those basic operations actually work – both because we suspect you do remember how to carry numbers for purposes of addition and subtraction and because you can, after all, use that calculator we mentioned. We do, however, go into a bit of detail about the logic of fractions, decimals, and percentages because we believe it will be helpful in dealing with the simple equations you may be called upon to both set up and solve.

Basic Operations with Whole Numbers

Addition: Combining two or more numbers (addends) to find the total (sum).

If a corporation has issued 1000 shares and issues 500 more, how many shares has it issued? (1000 + 500 = 1,500)

Subtraction: Removing one or more numbers (**subtrahends**) from another number (**minuend**) to find the difference (**difference**).

A company is a widget retailer. If it pays the manufacturer \$25 for each widget it buys and receives \$50 for each widget it sells, what is its gross profit⁵ per widget? (\$50 - \$25 = \$25)

Multiplication: A method for quickly combining a number (the **multiplicand**) to itself a given number of times (the **multiplier**). The result is the **product**.

A shareholder of Z Co. is entitled to five votes for each share owned. Zelda owns 1,000 shares. How many votes is Zelda entitled to cast? (You could add 5 to itself 1,000 times or multiply: $1,000 \ge 5,000$)

Sometimes the operation of multiplication is signified by either an "x" or a "." and sometimes it is signified simply by placing the multiplier in parentheses. Moreover, when you are working with

⁵ "Gross profit" is an accounting term denoting the difference between the amount paid for an item and the amount for which it is sold. If you are thinking about the fact that the retailer probably has other expenses, such as paying its sales personnel, you are ahead of the curve.

variables (those troublesome values of "x" or "n" you sometimes are asked to solve for) it is conventional to dispense with any signal at all. Thus 3n means 3 x n, 3 n, or 3(n).

Division: A method for separating a number (the **dividend**) into a given number of equal parts (the **divisor**), which may or may not leave an amount (a **remainder**) that is not equal to the others. The result is the **quotient**.

Yco Partnership has three partners who have agreed to share profits equally. In year one, Yco has net income of \$90,000. In year two, Yco has net income of \$100,000. How much does each partner get in each year? (Year one: $90,000 \div 3 = 30,000$; Year two: $100,000 \div 3 = 33,333.33$ with a remainder of one cent)

Sometimes the operation of division is signified by a " \div " and sometimes it is signified by placing a "/" between the dividend and the divisor.

Order of Operations: Just remember to "Please Excuse My Dear Aunt Sally." If an operation appears within parentheses, perform it first. (If there are nesting sets of parentheses, start with the innermost set and solve out.) An exponent (as discussed below, this is a signal directing you to multiply a number times itself the indicated number of times) appearing next to a number within parentheses would indicate the exponential expansion is part of the operation to be performed within the parentheses, whereas one appearing immediately after parentheses would call for the exponential expansion to be performed with respect to the result of the operation described within the parentheses. Unless overridden by the parenthetical rule, multiplication and division are performed before addition or subtraction.

2 x 3 + 4 = 6 + 4 = 10 2 x (3+4) = 2 x 7 = 14 (3 x 4 + 1) + 5 = (12 + 1) + 5 = 13 + 5 = 18 (3 x (4 + 1)) + 5 = (3 x 5) + 5 = 15 + 5 = 20 (2 + 10²) + 4 = 2 + 100 + 4 = 106(2 + 10)² + 4 = 12² + 4 = 144 + 4 = 148

Signs and Operations with Negative Numbers

What is a Sign? For our purposes, all numbers other than zero have a "sign." A number greater than zero has a **positive** sign, which may or may not actually be signaled with a "+." A number less than zero has a **negative** sign, which may be signaled with a "-" or, in financial reporting, by placing the number in parentheses.

Adding a Negative Number: Adding a negative number has the effect of subtracting it.

Aco earns \$50,000 in each of its first three quarters, but loses \$10,000 in its fourth quarter. How much does Aco earn for the entire year?

$$50,000 + 50,000 + 50,000 + (10,000) = 140,000$$

Subtracting a Negative Number: Subtracting a negative number has the effect of adding it.

Multiplying Negative Numbers: Multiplying a positive number by a negative number results in a negative number. Multiplying two negative numbers results in a positive number.

C Company started the year with \$500,000 in earnings retained from earlier years. It lost \$40,000 in its first quarter and projects that it will have the same results in each of the succeeding three quarters. What will the "hit" to retained earnings be for the entire year?

 $($40,000) \ge 4 = ($160,000)$

Thus, C Company expects to end the year with 500,000 + (160,000) = 340,000 in retained earnings.

Dividing Negative Numbers: Dividing a positive number by a negative number (or vice versa) results in a negative quotient. Dividing a negative number by a negative number results in a positive quotient.

Fractions, Decimals, and Percentages

Fraction: A fraction is composed of a **denominator** (on the bottom) and a **numerator** (on the top). The denominator is the number of parts into which a conceptual whole is specified to be divisible for purposes of the problem and the numerator is the number of those parts that have been specified to be present or otherwise relevant for purposes of the problem.

The bylaws of X Corp. specify that the owners of one-half (1/2) of the shares it has issued must be present at a meeting for business to be conducted. X Corp. has 5,000 shares outstanding. Essentially, the bylaws specify that 5,000 shares can be divided into two parts, and that the owners of one of those parts must be present. Thus, since 5,000 can be divided into two equal parts of 2,500, the owners of at least that many shares must be present for a meeting.

You will want to keep in mind that the smaller the denominator, the larger the pieces into which the conceptual whole is being divided. In other words, $\frac{1}{2}$ of a pie is a larger piece than $\frac{1}{4}$.

You also will want to remember that a fraction with the same numerator and denominator is equal to one.

Adding and Subtracting Fractions: As a general rule, before adding fractions to, or subtracting them from, one another, they should be stated in terms of a **common denominator**. One way to do this is to multiply each of the original fractions by a new fraction, equal to one, that uses the denominator of the other original fraction as both the numerator and the denominator.

Thus, to add 1/5 and 1/6, follow the following steps:

 $1/5 \ge 6/6 = 6/30$ $1/6 \ge 5/5 = 5/30$ 6/30 + 5/30 = 11/30 Sometimes this will result in a sum or difference that is, from a mathematician's perspective, not adequately **simplified** (or **reduced**). To simplify a fraction, divide both the numerator and denominator by the highest number equally divisible into each.

Thus, to simplify 36/48, divide both the numerator and the denominator by 12.

 $36 \div 12 = 3$ $48 \div 12 = 4$ So 36/48 = 3/4 and would be more properly stated in the simplified form.

Multiplying and Dividing Fractions. To multiply fractions, simply multiply the numerators times one another and the denominators times one another. To divide them, invert the divisor and multiply it times the dividend.

Keeping it simple, ¹/₄ of a pie has been eaten. Jen and Jem want to share the remaining pie equally. How much does each one get? $(3/4 \times 1/2 = 3/8)$

Still keeping it simple, suppose Joe is watching his weight and knows he shouldn't eat more than 1/8 of a pie at each sitting. He knows he has $\frac{3}{4}$ of a pie left over after a dinner party. How many servings does he have? $(3/4) \div (1/8) = (3/4) \times (8/1) = (24/4)$, which simplifies (by dividing both the numerator and the denominator by 4) to 6/1, or 6.

Multiplying or dividing a whole number by a fraction simply requires conversion of the whole number into a fraction with a denominator of one before performing the operation.

 $7 \ge \frac{2}{3} = \frac{7}{1} \ge \frac{2}{3} = \frac{7}{2} \ge \frac{7}{2} = \frac{7}{2} \ge \frac{14}{3}$

When the numerator is greater than the denominator, it is usual to divide the denominator into the numerator and restate the fraction as a whole number plus any fractional remainder. Thus, in the two preceding examples,

 $6 \div 1 = 6$ (as already noted), and

$$14 \div 3 = 42/3$$

Decimal Notation: Decimal notation is how numbers are written in a "base ten" number system – which we will not belabor. For our purposes what is important is that, in the case of a number that is reported using a decimal point, the numbers to the right of the decimal point represent a fraction with a denominator of some multiple of ten. Each place to the right of the decimal point indicates multiplication of the denominator by another ten.

.1 = 1/10 .01 = 1/100 .001 = 1/1000 .5 = 5/10 (which simplifies to ¹/₂) .75 = 75/100 (which simplifies to ³/₄)

When numbers are written in decimal form it frequently is easier to perform basic operations than it would be if they were written in fractional form.

Adding and Subtracting Decimals: Because 1/10 can be multiplied by 10/10 (which is equal to one) without changing its value, .1 is the same as .10 or, for that matter, .100, .1000, etc. Rather than bothering to convert decimals to a common denominator, the convention is simply to add them "as they stand," presented with the decimal as their point of alignment.

Thus, .1 plus .01 can be rewritten (or rethought) as

.10 <u>+.01</u> .11

It would be more usual, though, simply to write (or think)

.1 <u>+.01</u> .11

In the case of .5 plus .28, then, you would write (or think)

.5 <u>+.28</u> .78

In the case of subtraction, however, it would not be unusual to write the additional zeroes (to facilitate borrowing) if one were calculating by hand. Thus, .8 minus .764 is the same as

.800 <u>-.764</u> .036

Multiplying and Dividing Decimals: Because a number with a decimal point is a representation of a fraction with a denominator that is a multiple of 10, using it as either a multiplicand or a multiplier will result in a product that is a fraction (that may ultimately be reduced, including to a whole number) with a denominator that is the appropriate ten-fold larger than before the operation was performed. Since the larger the denominator, the smaller the piece of the pie, so to speak, the product will be expressed in terms of smaller pieces. Hopefully, this will help you remember that as decimals are multiplied, the decimal point "moves" to the left.

.25 x .1 = (25/100) x (1/10) = 25/1000 = .025

When you are multiplying a whole number times a decimal, the effect is the same.

$$100 \text{ x} .01 = (100/1) \text{ x} (1/100) = 100/100 = 1.00$$

Using a number with a decimal point as a divisor is, of course, the same as dividing by a fraction with a denominator of a multiple of 10. Since dividing by a fraction requires its inversion and multiplication, the resulting quotient will be some multiple of ten larger than if a decimal were not involved. This means the decimal point "moves" to the right.

Compare 35/25 = 7/5, which re-expressed in decimal notation (in tenths rather than fifths, or 14/10) is 1.4,

with $35/.25 = (35/1) \div (25/100) = (35/1) \times (100/25) = 3500/25$, which simplifies to 700/5, or 140.

Operations with Money: Decimal notation is used to represent amounts in United States currency, with each cent equaling 1/100 of a dollar. ("Cent" derives from the Latin *centum*, which means 100.) It may seem that it isn't really worth keeping track of cents, but that is not necessarily the case.

W Inc. has 1,000,000 shares outstanding, all with equal rights to any dividend declared. The amount available for dividends is \$750,000. The board of directors wishes to declare the maximum possible dividend. What is it?

 $750,000 \div 1,000,000 = 0.75$ per share.

Winnie owns 20,000 W Inc. shares. How large a check should she expect to receive?

20,000 x \$0.75 = \$15,000.

The V Partnership sells 100,000 units of a product for \$10.49. Rounding down to ignore the cents would result in sales revenue of \$1,000,000. Keeping track of the cents results in sales revenue of \$1,049,000.

Percentages: Decimal notation also is used to represent percentages, with the whole of a number, entity, etc., equal to 100%. (Going back to derivations, per *cent* literally means "per hundred.") Another way to think about it is that a number expressed as a percentage calls for dividing that number by 100.

Thus 100% = 100/100 = 1, 75% = 75/100 = .75, 125% = 125/100 = 1.25 and so on.

Do not include both a decimal point and a % sign unless you actually are trying to communicate that the decimal point should be moved to the left on account of both signals.

.25% = .25/100 = .0025

Exponents

Positive Exponents: A positive exponent directs you to multiply a number times itself a given number of times. It is noted in superscript to the right of the number to be multiplied.

 $10^3 = 10 \text{ x } 10 \text{ x } 10 = 1000$

Negative Exponents: A negative exponents tells you how many times to divide by a number. A negative exponent appearing in the numerator of a fraction is moved to the denominator and given a positive sign.

 $10^{-3} = (1/(10 \text{ x } 10 \text{ x } 10)) = .001$

Solving One-Variable Equations

Solving one-variable equations (a/k/a "solving for x") first calls for the application of logic in setting up the equation to be solved. The logic may be very simple indeed.

First, let us say that Irina, an investor, purchased a share of stock at the beginning of the year for \$50. At the end of the year, the issuer of the stock distributed every penny it earned during the year as dividends to its shareholders. Irina received \$5. She wants to know whether she would have been better off putting the \$50 in a federally insured savings account paying interest at a rate of 1%. The rate of return on her investment, then, is the unknown *x* and an appropriate equation is

50x = 5

since \$50 times the unknown rate produced the \$5 she received.

In a second example, let us say that Irving, an investor, knows that his savings account in a federally insured bank pays interest at a rate of 1%. He does not foresee the rate is likely to change and wants to make an investment today that will pay him \$100,000 per year, assuming he withdraws the entire amount of interest on an annual basis. How much must he invest?

X, which is the figure he wants to determine, represents the amount to be invested. To achieve his goal, *x* times the rate of interest he thinks he can earn (.01) must equal the amount he desires (\$100,000). The appropriate equation therefore is

x(.01) = 100,000

Solving either equation requires you to isolate *x* on one side of the equation. There are four simple tools available, only one of which is needed for this particular example. The four tools are:

The Addition Property: Adding the same number to both sides of an equation does not change its meaning.

If
$$x = y$$

 $x + 3 = y + y$

3

The Subtraction Property: Subtracting the same number from both sides of an equation does not change its meaning.

If
$$x = y$$

x - 2 = y - 2

The Multiplication Property: Multiplying both sides of an equation by the same non-zero number does not change its meaning.

If
$$a = b$$

 $3a = 3b$

The Division Property: Dividing both sides of an equation by the same non-zero number does not change its meaning.

If
$$3a = 3b$$

 $3a \div 3 = 3b \div 3$

Couple the foregoing with the knowledge that fractions can be reduced by dividing both the numerator and the denominator with the largest number that will divide evenly into both, and you are ready to recognize that you can simply cancel the 3s, leaving you with

a = b

Returning to Irina's case, remember that the equation to be solved is 50x = 5. Applying the division property to isolate *x*,

$$50x \div 50 = 5/50$$

Since 50/50 = 1, x is isolated on the left side of the equation, and we learn that

x = 5/50, which simplifies to 1/10. Restated as a decimal, it is .1.

This means that Irina got ten times the rate of return she would have gotten had she put her money in the bank and earned .01.

In Irving's case, x(.01) = 100,000. Again applying the division property to isolate x,

 $x(.01) \div .01 = 100,000/.01$

Since .01/.01 = 1, x again is isolated on the left side of the equation, and we learn that x = 100,000/.01 or x = 10,000,000.

Thus, Irving will have to put \$10,000,000 in a savings account to produce the income stream he desires, given an assumed interest rate of .01.

II. Accounting and Financial Statements

Accounting is a professional discipline the goal of which is to keep track of the performance of businesses as an aid to managers, investors, analysts, and regulators. It is an ancient discipline, with evidence of its existence dating back thousands of years. Its modern form was inaugurated by Italian merchants and bankers in the 15th century. Their innovations made possible the development of modern finance, and their approach remains to a large extent the basis of

modern accounting. As an independent profession, accountancy proliferated in the 19th and 20th centuries in Europe and the Americas, and the work of accountants is now integral in the lives of all businesses of meaningful size.

In modern society, accountants perform a variety of functions, but here we consider only one of them: "financial accounting." Financial accounting is a service performed mainly for the benefit of "outsiders" to the company – shareholders, lenders, prospective investors, analysts, and regulators.⁶ To do it, accountants keep track of the financial condition and performance of a company over time, and periodically produce formalized reports for third parties to read. These reports are known as "financial statements." We will focus on the three most important such statements: the balance sheet, the income statement, and the statement of cash flows. Our main job for the rest of this section of *Solving for X* is to figure out what those statements are, why they are important, and how they are created.

Before we get to that, a worthwhile question is why we would study accounting in law school, and why in this class in particular. Some knowledge of accounting is useful to any lawyer, no matter what. Litigators, domestic relations lawyers, estate planners, and many others can expect sooner or later to need to know how to value some company, and from time to time they might need to read a balance sheet or income statement or the like. This kind of knowledge is especially significant, however, for transactional planners and securities specialists. Just a few of the specific doctrines discussed in the casebook that call for some familiarity with it are the sharing of profits and losses in unincorporated entities (see chapter 7), the accounting remedy (see chapter 12), the distribution of assets on dissolution (see chapter 9), the legality of corporate dividends (see the supplementary materials in this Supplement below, supporting chapter 15), and the public disclosure documents that publicly traded companies must file under the federal securities laws (see chapter 28).

Finally, in some sense, accounting (along with finance, which we'll talk about when we're done with accounting) is just the language of business. It is the language that the business lawyer's clients live and breathe: it is the way they think. Having some conversant skill in that language is key to relating with clients and earning their business, understanding their needs, and applying many of the legal rules to which they are subject.

A. Accounting Conventions and an Introduction to Financial Statements

If understanding financial accounting and financial statements is our main purpose, it will help to start with several basic conventions accountants observe in preparing them.

1. Double-Entry Bookkeeping and the "Accounting Equation"

We'll begin with that major innovation that made the 15th century Italian bookkeepers so important: their "double entry" or "dual entry" approach, now a cornerstone of financial

⁶ Another important accounting function is "managerial accounting," which relates to the preparation of information only for a firm's internal consumption, to aid its managers in business decision making.

accounting. Their insight was that every time a business engages in any transaction, the transaction can be thought of as having two effects. Say, for instance, that a new business is formed, and it is organized as a corporation. As its first act, the corporation sells shares of stock to an investor in return for cash. We might ordinarily think of this as really just one transaction, but from the accountant's perspective it has two separate, offsetting effects. On the one hand, the business itself has gained an asset—the purchase price of the stock it sold, which it now holds as cash. But on the other hand, the company is now subject to a claim against its assets—the ownership claim of the investor, a claim that will also be recorded in the company's books. Similarly, if the corporation had borrowed the money from a bank rather than exchanging stock for it, the corporation would record the bank's claim against the company's value as a liability.

The same concept of offsetting effects, and therefore offsetting entries, also applies in the context of other transactions, like exchanging cash for some other asset for use in the company's business. Imagine that after the corporation is formed, and after it exchanges some stock for cash or borrows cash from a bank, it uses some of that cash to purchase a new machine for its factory. There will again be two matching, offsetting account entries. In this case, however, they will both be accounts belonging to the corporation, and no third party's interest in the corporation will be affected. On the one hand, the account in which the company's cash is recorded will be reduced to reflect the payment made for the machine. On the other hand, the account in which the firm's durable property and equipment are recorded will be increased to reflect the value of the new machine.

Before expanding the discussion to double entry accounting for amounts that the company receives or consumes as it conducts its operations, let us pause to examine what we have learned from an integrally related perspective. Intrinsic to the system of double entry accounting is an important logical insight, important enough that it is known as the "**accounting equation**" or sometimes even the "basic" or "fundamental" accounting equation. It states that in any business, the following is always true:

Assets = Liabilities + Equity

In this equation, "assets" are economic resources owned by a business. Note that assets need not be owned debt-free to be considered assets for accounting purposes. It would be possible, for instance, for a company to acquire an asset – perhaps land – on the basis of a promise to the seller to make future payment. This would require recording the land as an asset and the associated obligation to make future payment as a liability (keeping the basic equation in balance).

Note as well that to make the fundamental equation work, we think of the business as an entity separate from its owners and its owners merely as people who have claims against its value. We make that assumption even when it is not legally accurate, as in the case of the sole proprietorship. As a legal matter, a sole proprietorship is not really an entity separate from its owner. It is just a person who owns assets and puts them to use to earn revenue. For accounting purposes, however, we think of it as an entity.

On its face, the claim of the accounting equation may seem simple or obvious, and indeed the equation is essentially a tautology. But it contains an insight that is key to valuing businesses: what a business uses to make its money is always purchased by either the money it has borrowed or by its owners' investments (which include prior earnings that have not been withdrawn). Saying the same thing a different way, we can identify the sum total of a firm's assets and then identify every person who has a claim to every last historic penny of them (because financial accounting generally is conducted on the basis of historic cost, rather than present value), by counting up the firm's liabilities and the claims of its equity owners.

This logic also happens to be inherent in the important financial statement known as the **balance sheet**, and indeed it is the logic that makes the balance sheet "balance." For this reason it is also sometimes known as the "**balance sheet equation**."

2. Introduction to the Balance Sheet and Income Statement

In its most pared down form, the balance sheet looks like the following, and you'll notice that its fundamental categories are just the three elements of the accounting equation. Moreover, it separates them in the same way. Assets are listed on the left side, and their total is exactly counterbalanced—just as if there were an equal sign between them—by the total of liabilities and equity on the right side:



Balance Sheet

Although this side-by-side balance sheet presentation makes a nice graphic point, it actually is not unusual for a balance sheet to appear in vertical alignment, with assets followed by liabilities and then equity. Users simply are expected to know that the total amount of assets shown equals the total of all liabilities and equity – and they always, repeat *always*, do.

Just to give the idea a little more substance, let's consider some of the examples from above. Say that a business is formed, and its initial shareholders purchase their shares for a total of \$100. On the same day, the firm also borrows \$100 from a bank. Assuming that the firm hasn't engaged in any other transactions and doesn't own or owe anything else, its balance sheet on that day would look like the one appearing below:



Balance Sheet

The numbers entered under "Total" on the left side and the right side are the same, and they therefore satisfy the accounting equation Assets = Liabilities + Equity. The same would be true if the company had used \$100 to purchase equipment. The Assets side simply would show "Cash" of \$100 and "Equipment" of \$100.

In fact, in double-entry accounting absolutely every transaction requires double entries, even if no asset results and even if the transaction is not with a creditor or owner. Assume, then, that the day after the balance sheet above was prepared our hypothetical company pays a worker \$20 in cash for one hour of work – perhaps for standing on a street corner telling people about the company's upcoming opening. Clearly, Cash, an asset, has been depleted. If there is not some counterbalancing entry, the next time a balance sheet is prepared it would not balance. Although it might be tempting to say some sort of asset has been created by the expenditure, accounting is a conservative profession and recognizes assets only when there is some reasonable certainty they will be of future use. Advertising has been determined not to fall in that category, and so the amount would be recorded as an "expense." By the time the next balance sheet is prepared, that expense must have an effect on the right side of the balance sheet. Since we would not expect an expense to be deducted from what a company owes its creditors, it should be obvious that the account to be affected ultimately must be an owners' equity account.

We thus are on the verge of recognizing the nature of the relationship between the balance sheet and the **income statement**. The income statement (also known as the "**statement of profit and loss**" or "**P&L**" or, as illustrated in Part IIB, sometimes something else) records for a period the amounts a company receives from its operations (**revenue**) and the amounts it expends to generate revenue (**expenses**).⁷ At the end of the period the difference between the two (**net income** or **net loss**) impacts owners' equity, either positively or negatively. The net amount will be recorded in an owners' equity account called something like "**Retained Earnings/(Accumulated Loss)**."



If a new balance sheet were prepared the day after the transaction with the worker (assuming the equipment purchase also took place), it would look like the one appearing on the following page:

⁷ As noted below, the income statement may also show gains and losses not attributable to its ordinary operations. These still ultimately will be reflected in owners' equity.

Balance Sheet



The income statement for the one day period between balance sheets would show Advertising Expense of \$20 and thus a Net Loss of \$20 as its only entries.

3. T-Accounts and Day-to-Day Bookkeeping

So how do accountants apply the accounting equation in their work, and how do they use it to produce the financial statements that are the end result of the whole financial accounting enterprise? Do they actually prepare an income statement and generate a new balance sheet every day to reflect all the transactions and changes since the last one? The second question has an easy answer: "No." The largest firms produce formal financial statements seldom do so more than quarterly (that is, every three months), and other firms that produce them may do so annually.

Ideally, however, a company does record transactions on a daily basis in its accounting "**journal**" – using, of course, the double-entry method. The transactions described in the last section would be entered as follows (with dates and explanatory notes, both of which have been omitted):

(Day 1)

1. Cash	\$1	00
	Paid-in Capital	\$100
2. Cash	\$1	00
	Loan	\$100

3. Equipment		\$100	
	Cash		\$100

(Day 2)

4. Advertising Expense \$20 Cash \$20

This bare-bones example provides a number of clues about how day-to-day double-entry bookkeeping is accomplished. Those transactions in which cash is incoming (1 and 2) list the cash side of the transaction first, and against the left margin. (The left entry always appears first.) This is because cash is an asset and appears on the left side of the balance sheet. The (highly sensible) convention thus is to record increases in cash as left-hand journal entries. The matching right-hand entries to paid-in capital and liabilities reflect the fact that equity and liabilities appear on the right side of the balance sheet.

The transactions in which cash is out-going (3 and 4) reflect right-hand entries (which obviously are decreases) to the cash account. The matching left-hand entry in 3 shows an increase in equipment, which is an asset and thus increases with left-hand entries. The left-hand entry in 4 is to an expense account. Expenses are conceptual decreases in equity. Since equity is a right-hand account and increases with right-hand entries, amounts that ultimately decrease equity logically are left-hand entries.

To reiterate, increases in assets (left-side accounts) are left-hand entries and decreases are right-hand entries. Increases in liabilities and equity (right-side accounts) are right-hand entries and decreases are left-hand entries. Revenue entries, because they ultimately increase equity, are right-hand entries and expense entries, because they ultimately decrease equity, are left-hand entries.

Mildly complicating the picture sketched so far is the traditional use of the term "**debit**" to refer to left-hand entries and "**credit**" to refer to right-hand entries. One might choose to regard this as mind-bending, or might simply write it off to the Latin derivations of the terms and then spend thirty seconds memorizing them.⁸ (The material that follows does make sparing use of them.) It is important, however, to disassociate them from any inference that a "credit" is a good thing so a "debit" must be a bad thing. For instance, a credit to cash is simply a right-hand entry to an asset account and thus a decrease in the cash balance – not usually cause for celebration.

In any event, the next step after preparing a double journal entry for a transaction is to post both sides to the appropriate **T-accounts** found in what is known as the company's "**ledger**." (Note that readily available accounting software will accomplish this automatically.) A T-account is socalled because it looks like a T. For example, our hypothetical company probably would post transactions affecting its amount of cash to a T-account that looks like this:

⁸ If you live in the District of Columbia, "D.C." provides a handy mnemonic device for remembering "Debit on the left." Otherwise you might have to rely on DC (direct current), prompted by the idea that accounting is electrifying!

Cash						
	Dr.			Cr.		
Date		Amount	Date		Amount	
Day 1	1	100	Day 1	3	100	
Day 1	2	100	Day 2	4	20	
Balance .	\$80					

The off-setting entries would also be posted to the appropriate T-accounts (Paid-in Capital, Loan, and Advertising Expense as indicated by the labeling in the relevant journal entry). The T-accounts obviously are a handy device for totaling and netting transactions at the end of the relevant period, just prior to preparing the financial statements.

4. Accounts in General

You might wonder how a company decides which accounts to keep or if there are any they are required to keep. Regulated entities such as public utilities do have to observe very specific rules in this respect. Other types of entities generally aim to keep those accounts that will allow them to prepare meaningful financial statements. For this purpose, "meaningful" means that the financial statements should provide a method for investors and others to compare the company's financial condition and performance to those of other companies, so there is a great deal of convergence with respect to the keeping of many accounts. This is especially true for those companies required, because they have registered securities under the federal securities laws, to comply with "generally accepted accounting principles" ("GAAP"), further discussed below.

The balance sheet and income statement already have been introduced. Balance sheets set out asset, liability, and equity accounts. Income statements set out the revenue and expense accounts that explain why the retained earnings/accumulated loss portion of owners' equity has increased or decreased since the date of the last balance sheet. (The income statement also reflects some items that are not technically revenue or expense, because they are amounts received or spent other than in the ordinary course of business. These most usually are called "gains" and losses" and they also impact owners' equity.)

The following comprises a list of some of the most common balance sheet and income statement accounts:

Balance Sheet Accounts

Income Statement Accounts



Speaking generally, you probably will encounter the most variability in the asset and expense categories. The relationship of the two categories is explored in the next section. Before moving on, though, it is worth dwelling on the **current** v. **non-current** classifications of assets and liabilities manifest in the lists above. Current assets are cash and other assets that are expected to be liquidated into cash for use by the business within the next twelve months. Current liabilities are liabilities that must be paid within the next twelve months. (If you think it would be a good idea to compare the two to determine a company's financial health, you once again are ahead of the curve.) Assets that are not current are referred to as "**fixed**." Liabilities that are not current are "**long-term**."

5. The Relationship of Assets and Expenses, Accrual and the Matching Principle, and the Introduction of Contra Accounts

We noted above (and reiterate below) that accounting is a conservative profession. The earlier acknowledgment was in the context of characterizing an expenditure as either an asset or an expense. The line can be a hazy one; when in doubt about whether an expenditure will give rise to future value, and thus properly be "booked" as an asset, it should be expensed. (Recording an expenditure as an asset is referred to as "**capitalizing**" it; recording it as an expense is "**expensing**" it.) Notably, this approach means that a company's own costs of research and development must be expensed, rather than capitalized, even if the result is a patentable discovery. (Only if a patent is acquired from a third party is it proper to treat it as an asset.)

More generally, it is important to understand that, with notable exceptions such as accounts receivable and land, assets essentially are expenses waiting to happen. In other words, many assets are expected to be used up over time in the process of generating a company's revenue. Perhaps the clearest example of this is inventory. As inventory is sold, the Inventory asset account is decreased (with a right-hand entry) and an expense account known as "Cost of Goods Sold" ("COGS") is increased (with a left-hand entry). Because the expense is a conceptual decrease in retained earnings/accumulated loss, the balance sheet will balance at the end of the day (the period, really).

The next section goes into more detail about **accrual** and **cash basis** accounting, but we will introduce them here. For our purposes, they differ only with respect to the timing of recognition (in the company's journal of accounts, thence posted to T-accounts, the income statement and, ultimately owners' equity) of revenue and expense. Under the cash method, revenues and expenses are only recorded when they are received or paid in cash or a cash-equivalent. Under the accrual method (which is required by GAAP), revenue is "**realized**" and thus recorded only when the prospective recipient has completed all elements of the transaction entitling the recipient to collection, and expenses are **matched** (under something called the **matching principle**) to the revenue to which they contribute. If it is not clear when, or that, expenses will contribute to revenue, they are recorded as soon as the obligation to pay them arises (that is, when they are "**incurred**.")

Mookie's Barbecue just finished catering a barbecue for Qco. The agreed upon price is \$5,000, payable in sixty days. Mookie's keeps its books on the cash basis, while Qco uses the accrual method. Mookie's will make no entry with respect to the amount it expects to receive until it actually is received (although if it paid workers or bought supplies with cash it would enter the expenses when the cash changes hands). Qco immediately will make (something like) the following (bare-bones) entry:

Barbecue Expense	\$5,000	
Accounts	Payable	\$5,000

Now, assume instead that it is Mookie's that reports on the accrual basis while Qco uses the cash method. Qco will have no entry for the barbecue until, in 60 days, it pays its bill. Mookie's, as soon as it completed the clearing away, should have made the following entry:

Revenue	\$5,000	
	Accounts Receivable	\$5,000

All that said and illustrated, it is usual *even for companies preparing their income statements on the cash method* to recognize, through the process of **depreciation**,⁹ the fact that their fixed assets (other than land) are assumed to lose value over time as they are used to produce revenue. It is not necessary to get into the various methods for calculating the charge per period (there are several, including some mandated for tax purposes), but it is necessary to recognize that, conceptually, depreciation is a process for gradually turning an asset into an expense. For double entry purposes, this works nicely since expenses are left-hand entries and decreases in asset accounts are right-hand entries. The only real trick, then, is to understand that instead of directly crediting the relevant asset account (that is, decreasing it with a right-hand entry), the convention is to continue to carry the asset at the **historic cost** amount paid for it and to record its decrease in value in a separate, paired account called "**Accumulated Depreciation**." The (bare-bones) journal entry would look like this:

Depreciation Expense	\$XXX	
Accumulated	Depreciation	\$XXX

Depreciation Expense is (of course) an expense account, appearing on the income statement in partial explanation of changes in Retained Earnings/(Accumulated Loss), an equity account on the balance sheet. Accumulated Depreciation is one example of what is called a "**contra**" account – an asset account created for the specific purpose of keeping track of certain changes in the value of its paired asset, while permitting the asset itself to be carried at its historic cost. The net result, as far as Total Assets are concerned, is the same as if the decrease had been reflected directly in the asset account.

6. Re-cap

Before moving on, let's reiterate some of the things we've learned thus far in the accounting portion of *Solving for X*:

1. At all times, assets must equal the total of liabilities and owners' equity.

2. Assets increase with left-hand entries (debits) and decrease with right-hand entries (credits).

3. Contra accounts can be paired with assets to reflect their decline in value as they are used in a business, while still permitting the historic cost of the asset to be shown. The decrease is shown by a right-hand entry (credit) in the contra account, which is matched with an expense entry (see below).

4. Liabilities increase with right-hand entries (credits) and decrease with left-hand entries (debits).

5. Owners' equity increases with right-hand entries (credits) and decrease with right-hand entries (debits).

⁹ The same process used in the case of intangible assets such as patents and copyrights is called "amortization."

6. The total amount of owners' equity is determined by the amount that the owners have paid for their ownership rights plus the amount that the company has earned or lost. (We have not discussed the effect of withdrawals, but it should be obvious that they would reduce both an asset account *and* the amount in retained earnings/(accumulated loss) and/or paid-in capital.)

7. The income statement provides the details for changes in retained earnings/(accumulated loss) between balance sheets (other than those attributable to distributions to the owners).

8. The income statement consists primarily of revenue accounts and expense accounts.

9. Revenues, which are conceptual increases in owners' equity, are reflected with righthand entries (credits).

10. Expenses, which are conceptual decreases in owners' equity, are reflected with lefthand entries (debits).

11. In cash basis accounting, revenues and expenses are recorded only when cash is received or paid.

12. In accrual accounting, revenue is recorded when it is earned, even if it has not been received. Expenses are recorded when they contribute to revenue or, if it is not possible to tell when or if that will occur, as soon as they are incurred.

Let's consider some additional examples. Say that Joe begins Joe's Hot Dogs, a restaurant business that he has decided to organize as a corporation. As his first act he invests \$10,000 in cash in the business, in exchange for all of its shares.

If there are no other transactions, the balance sheet will reflect \$10,000 in the asset Cash and \$10,000 in Paid-in Capital, an owners' equity account. Before the balance sheet is prepared, of course, Joe will have made dual journal entries: left for Cash and right for Pain-in Capital. These amounts, in turn, will have been posted to T-accounts for totaling and netting before the balance sheet is prepared.

As his next act, Joe uses the firm's ready cash to buy it some commercial kitchen equipment, at a total cost of \$5000.

The balance sheet will reflect \$5,000 expended for the equipment – recorded with a catchy account title like "Equipment" – as well as \$5,000 less in the Cash account than otherwise would be the case. Before the balance sheet is prepared, Joe will have made dual journal entries: left for Equipment and right for Cash. He also will have posted them to the appropriate T-accounts.

If the equipment is used during the period, the balance sheet also will show an appropriate amount of accumulated depreciation. Before the balance sheet is prepared, Joe will have made dual journal entries: left for Depreciation Expense and right for Accumulated Depreciation. The accumulated depreciation will result in a lower figure in Total Assets. The depreciation expense will result in a lower figure in Retained Earnings/(Accumulated Loss). Depreciation Expense also will appear on the income statement.

Next, Joe decides that running the place will be too much for him on his own, so he hires his first worker to help run the cash register. He pays the worker (Wilmer) \$1,000 in advance.

Obviously, the balance sheet will reflect the \$1,000 reduction in cash. The balancing entry depends on whether Joe reports on the cash or accrual method. If it is cash, he will have recorded the payment to Wilmer as an expense, even though it did not contribute to revenue. This means Retained Earnings/(Accumulated Loss) will show (\$1,000). Before the balance sheet is prepared, Joe will have made dual journal entries: left for Wage Expense and right for Cash, and will have posted to the appropriate T-accounts. Wage Expense also will appear on the income statement.

If Joe reports on the accrual basis, he will record the wage payment as an asset, since he expects it to contribute to revenue in a future period. This means his balance sheet will show "Prepaid Wages" as an asset that offsets the decrease in cash. The entries to the journal (with posting to appropriate T-accounts) will be a left-hand entry to Prepaid Wages and a right-hand entry to Cash. There will be no effect on the income statement or on Retained Earnings (Accumulated Loss) until the services are performed.

Finally, Joe purchases a few office supplies on credit and uses them immediately.

The treatment of the purchase depends, once again, on whether Joe is reporting on the cash or accrual method. Since the office supplies have been consumed, and thus are an expense, the cash method will not recognize them until the bill for them is paid. Under the accrual method, they will have been recorded as an expense (a left-hand entry), offset by a liability (a right-hand entry). The expense might be called something like "Office Supply Expense" and the liability might be called something like "Account Payable." The income statement will reflect the expense, in turn reflected in Retained Earnings/(Accumulated Loss). Note that because a right-hand (liability) entry is offset by a left-hand (owners' equity) entry, the net effect on the total of liabilities and equity is zero, so the balance sheet remains in balance.

7. More on GAAP, the Distinction between Cash and Accrual Accounting, and the Challenges of Historic Cost Accounting

As noted above, some companies are required by law to follow generally accepted accounting principles (GAAP). Others will be forced to do so by contracts with lenders or will feel practically compelled to conform to GAAP in order to compete effectively for investors. Establishing GAAP is now the responsibility of a private independent board known as the Financial Accounting Standards Board ("FASB"). The Securities and Exchange Commission ("SEC") in fact has authority under the federal securities laws to declare financial accounting standards for purposes of filings under those laws, but it generally has chosen to defer to FASB.

In the case of foreign filers, however, the SEC has opted to permit submission of filings prepared under International Financial Reporting Standards ("IFRS"). IFRS' principles and rules are similar to GAAP's, but differ in some respects.¹⁰

Familiarity with the entirety of GAAP is well beyond the scope of this module (or, for that matter, any single class in accounting). It is important to note, however, some of GAAP's most important organizing concerns.

First, GAAP is concerned with achieving the following overarching qualitative characteristics in accounting information:

- Relevance to users (requiring timeliness in reporting);
- Reliability;
- Comparability to the information of other entities; and
- Consistency from period to period.

The foundational principles or assumptions further guiding FASB in creating its rules and standards include:

- The separate entity assumption (an entity's financial affairs are separate from those of its owners);
- The going concern assumption (financial information is to be presented on the assumption that the entity will continue to operate in the foreseeable future; if the assumption is incorrect, full disclosure is required);
- The time period assumption (all companies can divide their activities into discrete periods of time);
- The monetary transactions principle (transactions can only be reported in terms of a currency);
- The realization principle (revenue can only be recognized once the underlying goods or services associated with the revenue have been delivered or rendered, respectively);
- The matching principle (expenses should be recognized during the period that they contribute to revenue);
- The cost principle (assets should be carried at the cost for which they were acquired);
- The consistency principle (accounting methods should be followed consistently from period to period; when this does not result in fair presentation, disclosure is required); and
- The materiality principle (an accounting standard or principle may be ignored if the effect will not be misleading).

¹⁰ According to the International Accounting Standards Board, which establishes IFRS, 116 countries out of 140 it surveyed require the use of IFRS for purposes equivalent to the use of GAAP.

Perusing these principles makes it easy to see, among other things, why GAAP requires accrual accounting: the realization principle prevents recognizing revenue when cash is received but the revenue has not been earned, and the matching principle requires reallocation of expenditures as necessary to show their contribution to the earning of revenue. Under the cash basis, of course, revenue and expenses are simply recorded when they are paid, regardless of when they are earned or come due.

The distinction between cash and accrual may strike one as a bit academic: the description above makes it seem that the choice primarily makes a difference in cases of transactions done on credit or obligations that go uncollected for some period. If a business paid all its expenses and earned all its income immediately in cash, wouldn't its financial statements be the same whether it chose the accrual basis or the cash basis?

It is worth a moment, however, to reckon with just how unlikely it is that a business ever would pay all of its expenses "immediately" in cash. In some instances a company will pay an expense-related amount in advance and in other instances well after the fact.

At the beginning of January, L Corp. pays \$12,000 for annual insurance on its property. At the end of March, it prepares its quarterly financial statements. If it uses the cash method, its income statement will show Insurance Expense of \$12,000, and the owners' equity Retained Earnings/(Accumulated Loss) account will reflect that entire amount. If it uses the accrual method, only \$3,000 will be recorded as an expense for the quarter. The other \$9,000 will be carried as an asset – Prepaid Insurance Expense. (Recall that many assets simply are expenses waiting to happen. The labeling in this case makes the relationship particularly clear.) In each subsequent quarter, \$3,000 will be deducted from the Prepaid Expense asset and appear as Insurance Expense.

At the beginning of January, M Inc. borrows \$100,000 to be re-paid in one year with interest at 12%. At the end of March, it prepares its quarterly financial statements. If it uses the cash method, it will show no interest expense. In fact, it will show no interest expense until the following year, even though it used the borrowed funds in the current year. If it uses the accrual method, it will record Interest Expense of \$3,000 (with a matching entry for Accrued Interest Liability) for the first and each of the subsequent three quarters.

Even if a company were not required to follow GAAP by federal law, contract, etc., it still might be required to use the accrual method for tax purposes (and then might well choose to use it for other accounting functions).¹¹ The difference between cash and accrual accounting can have significant tax consequences. A firm that reports its taxes using the accrual basis will have to report income in the current tax year even if it won't actually be received until next year. That will increase the firm's taxable income. On the other hand, it is possible to deduct expenses when they contribute to revenue and before they actually are paid.

In any event, from the perspective of measuring a firm's value, neither of the two methods is perfect, and each has pros and cons. Cash basis accounting has the virtue that it is simpler, and

¹¹ Companies with annual gross receipts in excess of \$5,000,000 *or* that carry inventory for sale to the public must use the accrual method for tax purposes.

removes at least some uncertainty from recordkeeping and valuation. But it also may misstate the real current value of a company. It would undervalue the firm if it excluded large, forthcoming payments from very credit-worthy payers, for example, and it would overvalue the firm if the firm had a lot of assets on hand but owed large amounts for expenses already incurred.

While we are speaking of under- and over-valuation, however, it also is relevant to spend a few moments on GAAP's cost principle, noted above. The FASB's interest in the reliability of financial statements is taken to dictate insistence that assets be carried at the amount for which they were acquired, rather than re-valued as a matter of passing market fluctuation. Everyone knows, however, that the value of assets really can – and does – go up and down. The intuition that assets often are "used up" is accommodated by the convention of recording depreciation expense with an offset in the accumulated depreciation contra account presented in conjunction with the associated asset. It may be no surprise to learn that when a company concludes that the value of an asset has been permanently impaired, it is required to establish a contra account (known as an "impairment" account) and record the diminution in value (the offset will be to an expense or loss account as appropriate). This preserves the historic cost record but assures (within limits) that total assets are not overstated. GAAP's conservatism principle thus is honored.

Transitory decreases and increases in asset value are not, however, recorded – except, of course, when they are! There now are classes of assets the markets for which are deemed adequately reliable to justify the practice of "**marking to market**" – that is, recording increases and decreases in market value as they occur. The convention, once again, is to carry the assets (for our purposes, publicly traded securities) at historic cost and to record the fluctuations in a paired contra account (known as a "valuation" account). The rules on exactly which account is debited if the contra account is credited or credited if the contra account is debited are a little tricky; suffice it to say that the net effect will be to an appropriately designated owners' equity account. The balance sheet will, rest assured, balance.

8. Introduction to the Statement of Cash Flows

As discussed above, the income statement generally provides an explanation for a period's changes in the owners' equity account Retained Earnings/(Accumulated Loss). A separate statement of the changes in the overall owners' equity account also may be prepared to account for such matters as contributions by, and distributions to, owners. It is intuitively straightforward and will provide a bridge from the owners' equity accounts on one balance sheet to the owners' equity accounts on the next.

The statement of cash flows ("SCF") is somewhat similar in that it provides a bridge between the cash account on one balance sheet to the cash account on the next. It also is intuitively obvious that the SCF will describe, for a period, a company's sources and uses of cash. The justification for the statement and the categorization of sources and uses requires more explanation.

In fact, before moving on, even what counts as "cash" for purposes of the SCF requires a bit of explanation. The SCF actually keeps track of both "cash" and "cash-equivalents." "Cash" includes currency on hand and amounts that are kept in demand deposits permitting withdrawals without notice or penalty. "Cash-equivalents" include short-term (90-day or less), highly liquid

investments such as U.S. Treasury bills and money market accounts. Transfers between cash and cash-equivalent accounts are not treated as either receipts or payments of cash.

It should be obvious that cash (and equivalents) can move into and out of a business entity for a variety of reasons, some of which have absolutely nothing to do with revenue and expense and could never be discerned from the income statement. Thus, in addition to receiving cash from customers as the result of ordinary business operations, earning it as investment income, or by earning interest on deposited funds, a company could get cash by selling its own shares, by borrowing it, or by selling major assets. Cash can be used to acquire inventory and to pay utility and other bills, but it also can be used to purchase fixed assets, to pay long-term debts, and to satisfy the demand of its investors for return on their investments. The SCF organizes all of those (and other) transactions in an attempt to allow investors, creditors, analysts, etc., to assess such matters as whether a company is likely to generate sufficient cash to maintain or expand current operations, to be able to pay its debts as they come due, and to pay dividends.

The SCF is divided to display three main categories of activity: operating activity, investing activity, and financing activity.

Operating Activities: Operating activities include, of course, receipts from customers and the expenses of carrying on operations, such as paying for goods. These expenses are deemed to include expenditures for research and development and paying taxes. Less obviously, operating activity includes **receiving interest and dividends** and **paying interest**.

Investing Activities: Investing activities include making and being repaid for loans to others (but not receiving interest), buying and selling other entity's securities (but not receiving dividends), and the purchase and sale of fixed assets (but not paying the interest on any obligation to pay for them).

Financing Activities: Financing activities include borrowing and repaying principal (but not paying interest on borrowings), receipt of money for issuing a company's own securities, and **paying** dividends to the owners of those securities.

The conventions with respect to receiving and paying interest and dividends indeed are only conventions, as opposed to the result of strictly logical compulsion, and in fact are different in the U.S. than in most other countries. Perhaps the best argument for categorizing all receipts of interest and dividends and all payment of interest as operating activity is that it is a simplifying presumption based on the following recognitions. Frequently, companies do extend credit to customers and thus receive interest as an integral part of their business model. They also may receive dividends from subsidiaries¹² that play a role in their business plan. In addition, interest often will be due on expense-related debt. It probably is worth noting that, in the case of "investment companies" – those the primary operating activity of which is making investments – the operating and investment activities are combined.

¹² The nuances of accounting for subsidiaries on a consolidated basis is well beyond the scope of this module.

There are two methods of preparing the statement of cash flows, both acceptable under GAAP. One (the "**direct**" method) is to return to the company's journal (easily done with the appropriate software) to retrieve every entry to the cash account during the relevant period. The transactions are then classified and displayed according to the categories described above. The other method (the "**indirect**" method) actually uses exactly the same approach with respect to the investing and financing categories. It differs and thus is "**indirect**" only with respect to operating activity. The basic idea (the details of which will be omitted) is to present an explanation of how operating cash flow differs from the net income shown on the income statement. For instance, it will make the point that depreciation expense reduced income, but was a non-cash charge. An example of an SCF prepared using the indirect method appears in the section that follows.

B. Sample Financial Statements with Additional Details

As already discussed, most companies produce financial statements at least annually and sometimes quarterly (which is to say, every three months). The three statements generally regarded as most important are the balance sheet, the income statement, and the statement of cash flows. Examples of each, with additional commentary, are set out below. Following those examples is a brief discussion of footnotes and of what is called "management's discussion and analysis" ("MD&A").

1. The Balance Sheet

The balance sheet is a snapshot of the value of a company at a given moment. A balance sheet consists of two columns of numbers. The left-hand column lists all of a company's assets. The right-hand lists all of its liabilities, as well as the claims of its owners against it. The balance sheet literally balances—the total of the two columns will always be exactly the same number. In effect, the assets column on the left-hand side counts up everything of value that the company owns, and the liabilities column on the right-hand side shows who has a claim to it as of a particular date. It is customary to present the company's most recent balance sheet alongside its balance sheet for the preceding equivalent period.

The balance sheet on the next page is one that was issued by a company that underwent its initial public offering ("IPO") (its first offering of its shares to the public) in early 2017. It was taken from the company's filing with the SEC. It uses slightly different terminology and obviously is more complicated than the balance sheets we were examining above (and is presented in vertical alignment rather than side-by-side), but there are things about it that should be quite familiar and some things you can easily figure out on your own. As you look it over, ask yourself the following questions, then turn to the page after the balance sheet to read the answers:

(1) Did Appian prepare its balance sheet on a cash basis or using the accrual method?

(2) Why are Accounts Receivable "net of allowance"?

(3) What would make "Deferred Commissions" an asset?

(4) Why is "Deferred Revenue" a liability?

(5) Why are there Deferred Tax Assets and Deferred Tax Liabilities?

(6) How many classes of shares are outstanding? Why do the preferred shares appear above the "Stockholders' Deficit" heading?

(7) Is "Stockholders' Deficit" the same thing we were calling "Retained Earnings/(Accumulated Loss)"?

(8) What is Accumulated Other Comprehensive Income"? [Hint: You probably won't be able to answer this one.]

APPIAN CORPORATION AND SUBSIDIARIES CONSOLIDATED BALANCE SHEETS

(in thousands, except share and per share data)

	As Decen	of ber 31,
	2015	2016
Assets		
Current assets		
Cash and cash equivalents	\$ 31,393	\$ 31,143
Accounts receivable, net of allowance of \$400	34,228	46,814
Deferred commissions, current	5,316	7,146
Prepaid expenses and other current assets	2,030	3,281
Total current assets	72,967	88,384
Property and equipment, net	2,892	3,101
Deferred commissions, net of current portion	7,354	10,860
Deferred tax assets	22	12
Other assets	165	381
Total assets	\$ 83,400	\$102,738
Liabilities, Convertible Preferred Stock and Stockholders' Deficit		
Current liabilities		
Accounts payable	\$ 2,633	\$ 5,057
Accrued expenses	4,350	2,860
Accrued compensation and related benefits	5,737	9,554
Deferred revenue, current	40,220	52,000
Current portion of long-term debt	_	6,111
Other current liabilities	564	437
Total current liabilities	53,504	76,019
Long-term debt, net of current portion	10,000	13,889
Deferred tax liabilities	916	32
Deferred revenue, net of current portion	12,890	18,108
Preferred stock warrant liability	650	850
Other long-term liabilities	1,415	1,917
Total liabilities	79,375	110,815
Commitments and contingencies (Note 10)		

Convertible preferred stock

Series A convertible preferred stock—par value \$0.0001; 12,127,468 shares authorized and 12,043,108 shares issued and outstanding as of December 31, 2015 and 2016; liquidation preference of \$17,915 as of December 31, 2016 17,058

17,915

Series B convertible preferred stock—par value \$0.0001; 6,120,050 shares authorized,		
issued and outstanding as of December 31, 2015 and 2016; liquidation preference of		
\$37,500 as of December 31, 2016	37,500	37,500
Stockholders' deficit		
Common stock—par value \$0.0001; 61,462,320 shares authorized and 34,274,718 shares		
issued and outstanding as of December 31, 2015 and 2016	3	3
Additional paid-in capital	—	
Accumulated other comprehensive income	971	1,330
Accumulated deficit	(51,507)	(64,825)
Total stockholders' deficit	(50,533)	(63,492)
Total liabilities, convertible preferred stock and stockholders' deficit	\$ 83,400	\$102,738

The accompanying notes are an integral part of these consolidated financial statements.

(1) Did Appian prepare its balance sheet on a cash basis or using the accrual method?

This should be fairly easy. You were told the filing was made with the SEC. The SEC requires GAAP compliance, and GAAP requires accrual method accounting. References on the balance sheet to "prepaid expenses" and "accrued expenses" also are obvious clues.

(2) Why are accounts receivable "net of allowance"?

"Net of allowance" suggests a reduction in the asset Accounts Receivable. Indeed, it represents the existence of a contra impairment account to reflect the assumption that not all accounts receivable will be collectible. (When the contra account is credited with a right-hand entry there would be a left-hand entry to "bad debt expense.") Appian's explanatory footnote is as follows:

Accounts Receivable and Allowance for Doubtful Accounts

Accounts receivable are stated at realizable value, net of an allowance for doubtful accounts. The allowance for doubtful accounts is based on our assessment of the collectability of accounts. We regularly review the composition of the accounts receivable aging, historical bad debts, changes in payment patterns, customer creditworthiness and current economic trends. If the financial condition of our customers were to deteriorate, resulting in their inability to make required payments, additional provisions for doubtful accounts would be required and would increase bad debt expense. To date, our allowance and related bad debt write-offs have been nominal. There was no change in the allowance for doubtful accounts from December 31, 2015 to December 31, 2016.

(3) What would make "Deferred Commissions" an asset?

If a "Deferred Commission" is an asset, it must represent someone's commitment to pay that amount to Appian in the future. This is what the explanatory footnote says:

Deferred Commissions

Deferred commissions are the incremental costs that are directly associated with subscription agreements with customers and consist of sales commissions paid to our direct sales force. Commissions are considered direct and incremental and as such are deferred and amortized over the terms of the related customer contracts consistent with the related revenue. Amortization of deferred commissions is included in sales and marketing expense in the accompanying consolidated

statements of operations. Commission expense was \$3.8 million, \$4.6 million, and \$6.5 million for the years ended December 31, 2014, 2015 and 2016, respectively.

This is a little dense, but it means that the portion of amounts receivable from customers that is owed to employees is set out as a separate asset because it, unlike the rest of the amounts receivable, is regarded as an asset that predictably will become an expense.

(4) Why is "Deferred Revenue" a liability?

"Deferred Revenue" simply is money that has been received in cash or equivalents for goods or services that have not yet been provided. It represents Appian's obligation to perform in the future. When Appian does perform, the liability "Deferred Revenue" will be reduced, with an offsetting increase to "Revenue."

(5) Why are there Deferred Tax Assets and Deferred Tax Liabilities?

This topic is beyond our scope, but it should be clear that some tax amounts have been prepaid and others are still owing.

(6) How many classes of shares are outstanding? Why do the preferred shares appear above the "Stockholders' Deficit" heading?

There are three classes of shares outstanding: two preferred classes and one class of common. The placement of the preferred shares above the "Stockholders' Deficit" heading makes it clear that the obligation to pay the preferred holders a liquidation preference supersedes any claim the common holders may have.

(6) Is "Stockholders' Deficit" the same thing we were calling "Retained Earnings/(Accumulated Loss)"?

Yes!

(7) What is "Accumulated Other Comprehensive Income"?

This is income or loss that is reported and added to or subtracted from owners' equity even though there has been no transaction that gives rise to it. As noted above, some changes in asset value are noted in contra accounts with offsets assuring the balance sheet still balances. We are seeing the effect of those offsets in "Accumulated Other Comprehensive Income."

2. The Income Statement (or "Profit and Loss" Statement)

If the balance sheet is a snapshot of a company at a given moment, the income statement is a moving picture of its performance over time. It asks how much the company has earned in a given period, by adding up its total revenue and subtracting the expenses incurred to earn it. As noted above, the difference between the two is "income." As the following income statement shows, however, there really is much more to the story, or at least to the way the information on the income statement is conventionally presented. As you look at Appian's income statement (which is divided into a "statement of operations" and a "statement of comprehensive income"), ask yourself the following questions:

1. Why is there a distinction between "Cost of Revenue" and "Operating Expenses"?

- 2. What are "Other Expenses"?
- 3. What is "Gross Profit"?
- 4. What is the difference between "Operating Loss" and "Net Loss before Income Taxes"?

5. Why present "Net Loss before Income Taxes" separately from "Net Loss"?

- 6. What does "pro forma" mean? Why is the concept relevant only to 2016?
- 7. What does "basic and diluted" mean?
- 8. Why is the statement of operations separate from the statement of consolidated loss?
- 9. Why would anyone want to invest in this company?

APPIAN CORPORATION AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF OPERATIONS

(in thousands, except share and per share data)

	Year Ended December 31,					
		2014		2015		2016
Revenue:						
Subscriptions, software and support	\$	37,076	\$	53,207	\$	69,972
Professional services		51,920		57,997		62,951
Total revenue		88,996		111,204		132,923
Cost of revenue:						
Subscriptions, software and support		4,273		6,079		7,437
Professional services		32,524		42,402		42,686
Total cost of revenue		36,797		48,481		50,123
Gross profit		52,199		62,723		82,800
Operating expenses:						
Sales and marketing		29,088		38,300		54,137
Research and development		13,488		16,750		22,994
General and administrative		23,373		12,515		17,039
Total operating expenses		65,949		67,565		94,170
Operating loss		(13,750)		(4,842)		(11,370)
Other expense:						
Other expense, net		2,086		1,579		1,792
Interest expense		19		188		982
Total other expense		2,105		1,767		2,774
Net loss before income taxes		(15,855)		(6,609)		(14,144)
Income tax expense (benefit)		1,204		378		(1,683)
Net loss		(17,059)		(6,987)		(12,461)
Accretion of dividends on convertible preferred stock		856		861		857
Net loss attributable to common stockholders	\$	(17,915)	\$	(7,848)	\$	(13,318)

Net loss per share attributable to common stockholders:						
Basic and diluted	\$	(0.50)	\$	(0.23)	\$	(0.39)
Pro forma (unaudited):						
Basic and diluted					\$	(0.21)
Weighted average common shares outstanding:						
Basic and diluted	35,	717,803	34,	274,718	34,	274,718
Pro forma (unaudited):						
Basic and diluted					54,	723,043

The accompanying notes are an integral part of these consolidated financial statements.

APPIAN CORPORATION AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

(in thousands)

	Year	Year Ended December 31,		
	2014	2015	2016	
Net loss	\$(17,059)	\$(6,987)	\$(12,461)	
Other comprehensive income, net of income taxes:				
Foreign currency translation adjustment	812	159	359	
Total comprehensive loss, net of income taxes	\$(16,247)	\$(6,828)	\$(12,102)	

The accompanying notes are an integral part of these consolidated financial statements.

1. Why is there a distinction between "Cost of Revenue" and "Operating Expenses"?

Up until this point we have not explained that it is conventional to net revenue and the expenses most directly attributable to the production of, and most likely to vary with, that revenue as "Gross Profit." Then, expenses that are somewhat less directly linked and less likely to vary with revenue are deducted. If you are talking about the sale of tangible merchandise, the revenue is called "Sales" and the most directly attributable expense is "Cost of Goods Sold" (the cost of the inventory that actually is being sold). Here is how Appian's footnote describes its "cost of revenue":

Cost of Revenue

Cost of Subscriptions, Software and Support Revenue

Cost of subscriptions, software and support revenue consists primarily of fees paid to our thirdparty managed hosting providers and other third-party service providers, personnel costs, including payroll and benefits for our technology operations and customer support teams, and allocated facility costs and overhead.

Cost of Professional Services Revenue

Cost of professional services revenue includes all direct and indirect costs to deliver our professional services and training, including employee compensation for our global professional services and training personnel, travel costs, third-party contractor costs and allocated facility costs and overhead.

Appian's Operating Expenses in addition to its "Cost of Revenue" include the overhead paid to run its general offices, pay its officers, and the like. Although the expenses are

associated with operating its primary business, they are not closely linked to the amount of revenue that is earned and generally will not vary with it.

2. What are "Other Expenses"?

"Other Expenses" are expenses that do not relate to operations. These include interest expense and one-time amounts paid to settle litigation, reorganize the business and the like.

3. What is "Gross Profit"?

As noted above, "Gross Profit" is the net difference between "Revenue" and "Cost of Revenue" (or, when tangible inventory is sold, the difference between "Sales" and "Cost of Goods Sold").

4. What is the difference between "Operating Loss" and "Net Loss before Income Taxes"?

"Other Expenses."

5. Why present "Net Loss before Income Taxes" separately from "Net Loss"?

Common sense suggests it's because there is something special about taxes, but it does not provide the full explanation. Creditors are quite interested in the distinction because interest paid on debt is deductible for tax purposes. That means that every last dollar that was paid for taxes could, in the future, be made available to pay interest instead.

6. What does "pro forma" mean? Why is that concept relevant only to 2016?

For this purpose, "pro forma" indicates something is being shown that does not reflect the real state of events at the end of 2016.

Recall that these financial statements were filed in connection with an offering of stock in 2017. It therefore makes sense to re-figure calculations related to amounts presented on a "per-share" basis as though the new stock were outstanding. Going back more than one year just seems unnecessary, and isn't required by the SEC.

7. What does "basic and diluted" mean?

The income statement shows the loss per share of common stock for each of the years shown. "Basic and diluted" means that the calculation was based on the number of shares actually outstanding ("basic") and the number of shares that would also have been outstanding had the owners of preferred shares outstanding converted them into common (that's the "diluted" part). When earnings are positive, dilution is a bad thing. Since Appian experienced losses, dilution means the per-share loss is less – a good thing. So good, in fact, that it isn't actually regarded as dilution. Consider the following footnote explanation:

Net Loss Per Share

Diluted loss per share is the same as basic loss per share for all periods presented because the effects of potentially dilutive items were anti-dilutive given our net loss. The following securities have been excluded from the calculation of weighted average common shares outstanding because the effect is anti-dilutive for the years ended December 31:

	2014	2015	2016
Convertible preferred stock:			
Series A convertible preferred stock	12,043,108	12,043,108	12,043,108
Series B convertible preferred stock	6,120,050	6,120,050	6,120,050
Warrant to purchase Series A convertible preferred stock	84,360	84,360	84,360
Stock options	3,886,408	4,589,988	6,784,448

8. Why is the statement of operations separate from the statement of consolidated loss?

As discussed above, sometimes companies recognize income or loss even though they haven't been involved in a transaction. This is the case when there has been a change in the value of assets that can be reliably determined by reference to a ready market. In some instances that income or loss is called "Other Comprehensive Income/(Loss)." Sometimes it is shown on the income statement (what Appian calls its "statement of operations") and sometimes it is shown on a separate statement of comprehensive income/(loss) (which is what Appian has done). Note that Appian's other comprehensive income is a positive adjustment for a change in the value of currency, but the company still has a comprehensive loss because of the loss shown on its statement of operations.

9. Why would anyone want to invest in this company?

Good question, but one that will be better answered in the part of this module dealing with corporate finance. Sometimes one might just say that the heart wants what the heart wants, but there usually is more to it than that. The stock Appian offered to the public was sold at the price of \$12 per share and was trading at \$15 by the end of the day. It is well worth noting, though, that if one believes Appian's substantial Research and Development Expense actually is producing something of value (and the customers willing to pay enough to generate Appian's increasing revenue seems to think it is), one might be inclined to disregard that expense for purposes of calculating earnings.

3. The Statement of Cash Flows

The statement of cash flows provides a bridge between the cash account on one balance sheet to the cash account on the next. It describes, for a period, a company's sources and uses of cash, categorized as operating activity, investing activity and financing activity. Appian's statement of cash flows was prepared using the indirect method, which means that it explains why operating cash flow differs from the company's net loss. As you look at it, keep the following questions in mind:

1. Why would you add the amount of annual Depreciation Expense to the company's Net Loss?

2. Appian's Accounts Receivable increased between the end of 2015 and the end of 2016. Why would you subtract the amount of the increase?

3. The total of Appian's Accounts Payable and Accrued Expenses increased between the end of 2015 and the end of 2016. Why would you add the amount of the increase?

4. Appian's Deferred Revenue increased substantially between the end of 2015 and the end of 2016. Why would you add the amount of the increase?

5. Does the statement of operating cash flow make Appian look better or worse than its statement of operations?

6. Is the information presented on the statement of cash flow something you could derive for yourself from the balance sheet and income statement if you looked at them long enough?

APPIAN CORPORATION AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2014	2015	2016
Cash flows from operating activities:			
Net loss	\$(17,059)	\$ (6,987)	\$(12,461)
Adjustments to reconcile net loss to net cash provided by (used in)			
operating activities:			
Depreciation and amortization	610	763	764
Bad debt expense (recovery)	30	(22)	7
Deferred income taxes	399	(291)	(1,122)
Fair value adjustment for warrant liability	351	299	200
Changes in assets and liabilities:			
Accounts receivable	(1,450)	(6,639)	(11,154)
Prepaid expenses and other assets	130	(988)	(1,665)
Deferred commissions	(4,486)	(3,965)	(5,335)
Accounts payable and accrued expenses	1,932	1,058	1,287
Accrued compensation and related benefits	1,929	(968)	3,717
Other current liabilities	1,395	(251)	19
Deferred revenue	16,744	15,490	17,410
Other long-term liabilities	1,009	356	577
Net cash provided by (used in) operating activities	1,534	(2,145)	(7,756)
Cash flows from investing activities:			
Purchases of property and equipment	(2,633)	(524)	(984)
Net cash used in investing activities	(2.633)	(524)	(984)
Cash flows from financing activities:	(_,)	(=)	(, , , ,
Proceeds from issuance of long-term debt		10.000	20,000
Repayment of long-term debt			(10,000)
Proceeds from issuance of Series B convertible preferred stock, net			
of offering costs	37,380		
Repurchase of common stock	(21,013)		
Net cash provided by financing activities	16 367	10,000	10,000
Effect of foreign exchange rate changes on cash and cash equivalents	(912)	(930)	(1,510)
Net increase (decrease) in cash and cash equivalents	14 356	6 401	(250)
Cash and cash equivalents, beginning of year	10.636	24.992	31,393
Cash and cash equivalents, end of year	\$ 24.992	\$31.393	\$ 31.143
Supplemental disclosure of cash flow information:	<u>· - · · · · - · · · · · · · · · · · · ·</u>		

Cash paid for interest	\$ 	\$ 193	\$ 895
Cash paid for income taxes	\$ 70	\$ 1,055	\$ 610
Supplemental disclosure of non-cash financing activities:			
Accretion of dividends on convertible preferred stock	\$ 856	\$ 861	\$ 857
Accretion of issuance costs on convertible preferred stock	\$ 120	\$ 	\$ —

The accompanying notes are an integral part of these consolidated financial statements.

1. Why would you add the amount of annual Depreciation Expense to the company's Net Loss?

Depreciation is an obvious example of an expense that is not paid in cash. Its offsetting entry is to the accumulated depreciation account. Thus, it is clear that if you started out by assuming Net Loss was a loss of cash, the amount would be overstated by the amount of depreciation (and any other non-cash expenses).

2. Appian's Accounts Receivable increased between the end of 2015 and the end of 2016. Why would you subtract the amount of the increase?

Let's start with a scenario in which Accounts Receivable decreased. This is presumably because customers paid off their accounts with cash. The revenue from the transaction would have been "booked" in a prior period and would not appear in revenue for 2016. This means that the 2016 net loss would understate the amount of cash received. On the flipside, it simply is assumed that when current assets increase it represents a use of cash. This makes more intuitive sense when you think about an increase in, say, prepaid expenses (which obviously were prepaid in cash), but it is the general rule for current assets.

3. The total of Appian's Accounts Payable and Accrued Expenses increased between the end of 2015 and the end of 2016. Why would you add the amount of the increase?

Let's start, once again, with an opposite scenario in which Accounts Payable and Accrued Expense (both of which are current liabilities) decreased. It would be fair to assume that they decreased because they had been paid off with cash. Thus, the amount of a decrease would be subtracted (that is, it would increase the net loss) to reflect a use of cash not shown on the statement of operations. When current liabilities increase it is generally because an expense that could have been paid in cash was not.¹³ This is assumed to free cash for other uses.

4. Appian's Deferred Revenue increased substantially between the end of 2015 and the end of 2016. Why would you add the amount of the increase?

Deferred Revenue is a liability representing the obligation to perform in the future work that already has been paid for – which means that cash has been received. That cash, however, was not recorded as revenue because it was not yet earned. Thus, we know that Deferred Revenue is an amount of cash that was received but not reflected in the statement of operations, so it must be added.

¹³ It could also be because a long-term debt or part of a long-term debt becomes current because it is coming due within the next twelve months, but that is something that will be obvious.

5. Does the statement of operating cash flow make Appian look better or worse than its statement of operations?

Sometimes there will be quite a different story told by the two statements. A company with large non-cash expenses may show a loss on its income statement but be doing quite nicely from a cash standpoint. The opposite also is possible: a company that is strapped for cash may show substantial revenue from customers who have not yet paid. Appian is showing both a loss and a significant outflow of cash for operating activity – but it is doing somewhat better from a cash perspective. Appian's SCF does reveal, of course, that it is, in part, supporting its operating use of cash by issuing securities.

6. Is the information presented on the statement of cash flow something you could derive for yourself from the balance sheet and income statement if you looked at them long enough?

You certainly could replicate the indirect preparation of operating activity. You probably also could come fairly close on financing activity by focusing on increases in Paid-in Capital and long-term liabilities and changes in Retained Earnings/(Accumulated Loss) not linked to the income statement. Clues to investing activity also could be found in changes in fixed asset and investment accounts. Nonetheless, GAAP does require presentation of an SCF (without mandating the method of preparation).

4. Footnotes and MD&A

Appian's financial statements were accompanied by 22 pages of footnotes, and at the bottom of each of its financial statements you saw a legend to the effect that "The accompanying notes are an integral part of these consolidated financial statements." Sometimes, something on a company's financial statements just will not make sense unless you look at an explanatory footnote, and often the footnotes simply will make something easier to understand even if you eventually could figure it out on your own. In some instances, the footnotes will provide additional detail. In addition, there are some considerations that could be important to a company's financial condition that simply can't be quantified. A few of Appian's footnotes are set out below; others were set out above in the answers to some of the questions raised above.

Management's Discussion and Analysis is another important place to look for help in understand financial statements and their meaning. The following topics are addressed: liquidity, capital resources, results of operations, trends, uncertainties, and off-balance sheet financing (a subject beyond the scope of this module). Appian's MD&A ran an additional 31 pages; a very brief portion follows the excerpted footnotes.

APPIAN CORPORATION AND SUBSIDIARIES NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Organization and Description of Business

Appian Corporation (together with its subsidiaries, "Appian," the "Company," "we" or "our") provides a leading low-code software development platform that enables organizations to rapidly develop powerful and unique applications. The applications created on our platform help companies drive digital transformation and competitive

differentiation. We were incorporated in the state of Delaware in August 1999. We are headquartered in Reston, Virginia and have offices in Canada, Switzerland, the United Kingdom, France, Germany, the Netherlands, Italy, and Australia.

2. Significant Accounting Policies

Basis of Presentation

The consolidated financial statements and accompanying notes were prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP").

Use of Estimates

The preparation of our consolidated financial statements in conformity with U.S. GAAP requires us to make estimates and judgments that affect the amounts reported in these financial statements and accompanying notes. Although we believe that the estimates we use are reasonable, due to the inherent uncertainty involved in making these estimates, actual results reported in future periods could differ from those estimates.

* * *

Cash and Cash Equivalents

We consider all highly liquid investments with an original or remaining maturity of three months or less at the date of purchase, as well as overnight repurchase investments, to be cash equivalents.

* * *

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation and amortization. Depreciation is computed using the straight-line method over the estimated useful lives of the assets. Significant additions or improvements extending the useful life of an asset are capitalized, while repairs and maintenance costs which do not significantly improve the related assets or extend their useful lives are charged to expense as incurred.

Asset Category	Useful Life (in years)
Computer software	3
Computer hardware	3
Equipment	5
Office furniture and fixtures	10
Leasehold improvements	Shorter of useful life of assets or lease term

Impairment of Long-Lived Assets

Long-lived assets and certain intangible assets are reviewed for impairment whenever events or circumstances indicate that the carrying amount of an asset may not be recoverable through undiscounted cash flows from the use of the assets. If such assets are considered to be impaired, the assets are written down to their estimated fair value. No indicators of impairment were identified for the years ended December 31, 2014, 2015 and 2016.

* * *

10. Commitments and Contingencies

Operating Leases

We lease office space and equipment in our headquarters location in Reston, Virginia, as well as in the United Kingdom, France, Germany, Canada, and Australia, under non-cancellable operating lease agreements which have various expiration dates through 2026 for our office space and various expiration dates through 2019 for our equipment.

A summary of our future minimum gross and net lease commitments by year as of December 31, 2016 is as follows (in thousands):

	Office Leases	Eqı I	iipment .eases
2017	\$ 6,868	\$	277
2018	6,538		131
2019	6,720		6
2020	4,780		
2021	2,466		
Thereafter	1,304		
	28,676		414
Less: minimum payments to be received from subleases	(527)		
Total	\$28,149	\$	414

We record rent expense using the total minimum rent commitment, amortized on the straight-line method over the term of the lease. The difference between monthly rental payments and recorded rent expense is charged to deferred rent. As of December 31, 2015 and 2016, deferred rent totaled \$1.5 million and \$2.4 million, respectively, and is included within other current liabilities and other long-term liabilities on the accompanying consolidated balance sheets.

* * *

* * *

Other Commitments

We also have entered into a non-cancellable agreement for the use of technology that is integral in the development of our software and pay annual royalty fees of \$0.3 million.

Legal

From time to time, we are subject to legal, regulatory and other proceedings and claims that arise in the ordinary course of business. There are no issues or resolution of any matters that are expected to have a material adverse impact on our consolidated financial statements.

* * *

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes and other financial information included elsewhere in this prospectus.

* * *

Customer Cohort Analysis

We focus on acquiring new customers and growing our relationships with existing customers over time. The chart below illustrates our history of attracting new customers and expanding our revenue from them over time as they realize the benefits of building applications using our software.

Cohort Analysis—Subscription Software Revenue



The chart reflects annualized subscription revenue for the group of customers that became our customers in each respective cohort year. For instance, the 2013 cohort includes all customers whose contract start date was between January 1, 2013 and December 31, 2013. Annualized subscription revenue is the total amount of monthly subscription revenue for that applicable customer cohort in January of the following year multiplied by 12. We use January revenue data for the cohort of customers who first signed subscription agreements in the preceding year because January is the first month in which we are earning a full month of revenue from all such customers. Our annualized subscription revenue for the year ended December 31, 2016 for our 2013 customer cohort represented a 2.8 times increase over the annualized subscription revenue for the year ended December 31, 2013 for that 2013 customer cohort. Building upon this success, we believe a significant opportunity exists for us to acquire new customers as well as expand the use of our platform by increasing the number of users within our current customers' organizations.

C. Financial Ratios and Other Calculations: Diagnostic Tools Using Financial Statement Numbers

* * *

Investors and analysts make extensive use of simple tools to measure business performance that are based on numbers taken from financial statements. Many of them happen to take the form of ratios. The following charts show a few of the most commonly used.

Ratio or Other	Formula	Why do we care?
Calculation		(And other notes of interest)
Working Capital Calculation	Current Assets – Current Liabilities	Provides some indication of the ability to pay debts as they come due.
	(Expressed in \$)	
Current Ratio		Provides some indication of the ability to pay debts as they come due in a form that

1. Liquidity and Activity

\$100,000,000

	Current Assets/Current Liabilities	is easily comparable to the ratios of other companies.
Quick Ratio a/k/a Liquidity Ratio a/k/a Acid Test Ratio	Most Liquid (or Speedy) Assets/Current Liabilities	Provides a conservative indication of the ability to pay debts as they come due in a form that is easily comparable to the ratios of other companies.
Debt-to-Equity Ratio	Total Debt/Equity (Often expressed as x:y)	Provides an indication of the long-term solvency of a company by showing how much debt a company is using to finance its assets relative to the amount of value represented in owners' equity.

It should be easy to figure out how to plug a company's figures into the relevant formula. For instance Appian's working capital (Current Assets – Current Liabilities) at the end of 2016 was 88,000,000 - 76,019,000 = 11,981,000. This leaves a bit of a cushion and reassures the reader that Appian is solvent in the short term. This indeed is reassuring given that its debt to equity ratio (Total Debt/Equity) is $110,815,000 \div (63,492,000) = (1.74)$. A negative debt to equity ratio is regarded as a red flag as far as an entity's ability to remain in business is concerned. It can be overcome, however, if analysts feel that the assets of the company are worth more than the historic cost of acquiring them.

2. Profitability and Performance

Ratio or Other Calculation	Formula	Why do we care? (And other notes of interest)
Profit Margin	Operating Income/Net Sales (Expressed as %)	Indicates how much of a company's sales revenue translates into income in a form that is easily comparable to the same information for other companies.
Variation Analysis a/k/a Line Item Trend Analysis	This Year's Line Item Compared to Last Year's Line Item Compared to Year Before's Line Item	Comparing specific items of revenue or expense from year to year provides trend information.

Interest Coverage Ratio a/k/a Times Interest Earned Ratio (TIER)	Earnings Before Interest and Taxes (EBIT)/Interest Expense	Compares earnings before interest and taxes to the company's interest expense to see how much is available for future interest payments. It is calculated before interest and taxes because ability to pay interest is being tested and interest is deductible for tax purposes.
Earnings Per Share	Net Income – Dividends on Preferred Shares/Weighted Average of Common Shares Outstanding	Indicates per share profitability. May be presented as basic (using primarily the common shares actually outstanding) or diluted (including shares that would be outstanding if the company's other securities convertible into common shares were converted. Note that earnings per share ("EPS") are not necessarily, or even usually distributed to shareholders in their entirety.
Price-Earnings Ratio (P/E Ratio)	Market Price Per Share/Earnings Per Share	Shows the relationship between the market price for a share and the earnings per share in a form that can be compared to the P/E ratios of other, similar firms. If P/E is relatively low or high it may give an indication that the market regards investment in the company as relatively more or less risky.
Return on Equity	Net Income (this year)/Owners' Equity (at end of prior year) (Expressed as %)	Provides an easily comparable figure for an investment's rate of return.

Let's take a look, once again, at a couple of calculations for Appian. Appian's earnings per share in fact are a loss, and are set out on its statement of operations. The amount is (\$0.39), or a negative 39 cents per share. This might make you think that that the return on equity is negative, but it is not, because equity itself was negative. Net Income (2016)/Owners Equity (end of 2015) is (\$12,461,000)/(\$50,533,000), or positive 25%. This is not a particularly helpful figure; most financial analysts would not bother to calculate any metric using negative net income as an input.

3. Ratios and other Calculations involving Cash Flows

Ratio or Other Calculation	Formula	Why do we care? (And other notes of interest)
Cash Interest Coverage Ratio	Cash Flow Provided by Operating Activities/Total Interest Expense	Suggests ability to meet interest commitments (the risk of default on instruments requiring payments)
Cash Dividend Coverage Ratio	Cash Flow Provided by Operating Activities*/Cash Dividends Paid	Suggests ability to pay cash dividends in the future
	*Often reduced by dividends to preferred stockholders	
Quality of Income Ratio	Cash Flow Provided by Operating Activities/Operating Income	Shows degree to which income is generated without corresponding cash
Cash Flow Per Share	Cash*/Outstanding Shares**	Indicates dividend paying capacity, subject to discretion of board
	*Cash available for distribution to common stockholders ** Weighted average during period	
Cash Return on Assets	Net Increase (Decrease) in Cash (Current Period)/Total Assets (Prior Period)	Measures ability to generate cash flows available for investment in new assets

Appian has a 2016 operating cash flow of (\$7,756,000). Given that it is negative, one could calculate the ratios described above, but, with one exception, there would not be much point. It is clear that Appian's financial statements do not give any reassurance that there will be cash available to pay interest or dividends. The exception previously noted is cash return on assets. Appian had a net decrease in cash of \$250,000 from the end of 2015 to the end of 2016. Dividing that by the total assets at the end of 2015 - \$83,400,000 -gives a cash return on assets figure of -.003. This tells us that cash was lost relative to assets, but the loss was not an enormous one (.3%).

III.Finance

Finance theory (also known as "corporate finance") is sometimes described as the study of the economic functions of financial instruments in allocating a business's control, risk, and return. One of its main tasks is to determine what difference it might make to the overall value of an enterprise to allocate these characteristics one way or another. Like the other subjects dealt with in this module, finance is the subject of entire courses and, indeed, entire advanced degrees. The objective of this discussion is primarily to plant the seed of the idea that it is an interesting subject and of obvious relevance to anyone contemplating a career as a business lawyer.

A. Valuation and the Time Value of Money

1. Money and Market Value

It is critical, if elementary, to recognize that money and value are two different things. Money does not, as a theoretical matter, disappear (although it can, of course, be removed from circulation). For instance, money earned by a worker, then gambled and "lost" in a casino simply becomes the property of the casino operator, who presumably puts it to some other use. Value can, however, vanish in the twinkling of an eye.

Value can be created by taste, fancy, or belief in future events, manifest in someone's willingness to pay for an asset or one similar to it. Establishing value by reference to transactions in similar assets is an important concept in financial market terms: an investor typically values the shares in his or her portfolio by consulting the recorded results of recent actual transactions in identical stock, and a company's market capitalization is determined the same way. Thus, consider an example in which Corporation Z has one million shares outstanding, trading at twenty-five dollars per share (for a total market capitalization of twenty-five million dollars). Then, some number of shares – say one hundred thousand – trade at prices at or around fifty dollars per share. Everyone holding Z shares will be tempted to value them at or around fifty dollars per share (until there is a trade at a different price), and the market capitalization of Z may be placed in the neighborhood of fifty million dollars. This means that five hundred thousand dollars changing hands arguably has resulted in an increase in value of twenty-five million dollars.

Obviously, then, the value in American financial markets is not limited by the amount of money in circulation in the United States, or the amount of money plus promises to pay in the future. The value of a stock (or other) financial market is like the market capitalization of a

particular company. Thus, it is affected by transactions affecting fewer than all of the shares considered part of the market.

As we all know, what goes up at least sometimes comes down: an asset's value can be destroyed by a change in taste, fancy, or belief. This is precisely what happened when each of the historic financial bubbles deflated. When the 17th century Dutch ceased to believe that others would pay increasingly higher prices for tulip bulbs, the price of a bulb settled from as high as twelve acres of land to a few guilders over a relatively short period of time.¹⁴ When this sort of change occurs, the last seller of the asset before the devaluation presumably receives the cash or trade equivalent of its earlier value from the last buyer. The last buyer now holds an asset worth less than what he or she paid.

2. The Basics of Book Value, Return, and Risk

The moral of the little sermon above is that determining the value of an investment by reference to prevailing market price can be risky business. Opinions differ as to just how risky: proponents of something called the "**efficient capital market hypothesis**" would argue that at least some public financial markets rationally reflect the available information about a company, although there may be moments of irrationality (then-Federal Reserve Chair Alan Greenspan coined the term "irrational exuberance" to describe a late twentieth century financial bubble). That begs the question, however, of just how "rational" market actors might go about assessing value before making the trades that establish a firm's market price. Consider (being forewarned that we will quickly discard as insufficient) the following two, fairly simple possibilities:

Book Value. The book value of a company is discerned (get ready for this) from the company's books – that is, from its balance sheet. A company's book value is the total amount of owners' equity; the book value of a share is determined by dividing owners' equity by the number of shares outstanding. Book value may be a starting point, but obviously is quite unlikely to be a satisfactory end point, given that the historic cost of assets is unlikely to equal their current value, that research and development is regarded as an expense although it may produce something quite valuable, and so forth.

Adjusted Book Value. Mindful of the conventions of accounting, an analyst might make certain adjustments to book value in order to more realistically reflect the current value of assets and liabilities. For instance, if a building's value has been depreciated to zero but the building is still in use, an adjustment would be made. In the case of Appian, the financials of which were set out in Part IIIB, an analyst might choose to recharacterize a substantial portion of the Research and Development Expense recorded over time as an asset, changing its picture substantially.

The fact of the matter, however, is that if you were to compare either a company's book value or its adjusted book value to the market price for its shares (assuming a public market), you would be very unlikely to find that they match. To understand why analysts do not simply stop with those measures requires contemplation of something called the "**time value of money**," which is one of

¹⁴See Peter Garber, Tulipmania, 97 J. Pol. Econ. 535 (1989) (describing tulip mania and its causes).

the most basic insights of finance theory. Before turning to that subject, though, we will pause for a moment on the basic concepts of **rates of return** and **risk**.

Rates of return. Rates of return express the relationship of earnings and the amount that was invested to generate them. A company's overall rate of return on equity is determined by (as was noted above) dividing net income (this year) by total owners' equity (at the end of last year). An investor's rate of return on an investment is calculated by dividing the amount the investor earned by the amount invested.

I Corp. earned net income of 1,000,000 on total owners' equity of 15,000,000, for a return on equity of $1,000,000 \div 15,000,000 = .0666$ or 6.7%.

Imelda earned \$100 for every \$1000 she left in a savings account for an entire year. Her rate of return is 10%, because $$100 \div $1,000 = .10$.

Ignacio paid \$10,000 for an interest in a start-up business. His allocable share of the profits for a year was \$5,000. Ignacio's rate of return was 50%, because $$5,000 \div $10,000 = .50$.

Let's say you were trying to figure out how much someone would be willing to pay for an interest in an existing business that does not yet have an established market price. One way to figure it out might be to find similar businesses and reason backward from their rates of return.

Suppose Sanjay is thinking about buying shares from an existing shareholder of a privately held business that earned \$50 per share last year. He knows that there are companies in the same line of business that had a return on equity the prior year of 10%. He might then solve for *x*, where \$50 = .10(x). Isolating the variable tells us that x = \$500, so Sanjay might feel comfortable with that price.

Multipliers. When calculating value by reasoning "backward" from the rate of return, remember that dividing by a fraction requires its inversion and multiplication. Dividing by .10 always will be the same as multiplying by 10, dividing by .5 always will be the same as multiplying by 20 and so on. It is easy to find tables showing the multiplier equivalents for various percentage rates.

Risk. In the preceding hypothetical, Sanjay might feel less comfortable if he is told that the companies returning 10% have done so for many years, whereas the one he is thinking about investing in has existed for only one year. He might feel that he should pay less for a risky investment than for one that is relatively riskless. This means that he will want the rate of return on the amount he invests to be higher than 10% (if he indeed receives it). The amount by which the rate of return on a risky investment exceeds the rate of return on a riskless investment is the **risk premium**. The total rate demanded, when it is used to calculate the (theretofore unknown) value of investment in a business is known as the **discount rate**.

Knowing what other investors have decided to pay for equivalent income streams with equivalent risks is interesting to someone valuing an investment. How, though, did those "other investors" decide how much to pay? We shall turn to one of finance theory's major insights for the explanation.

3. The Time Value of Money

Specifically, finance recognizes that having some given amount of money now is worth more than it would be to have that same amount in the future. Why? Because if you have the money now, you can invest it and get some value out of it, whereas if you won't have it until some later point, you lose the income you might have earned from it in the interim. At a bare minimum, you might have put it in the bank and earned interest, but you might also have invested it in securities or business ventures, or you might have put it to work in your own business.

So, for example, if you pay me \$100 today, that's actually worth more to me than if you promise to give me \$100 in a year. Not only can we say that with some confidence, we can even calculate the difference. Let us say that I can invest the \$100 you give me today at 5% annual interest. In one year, how much will I have?

100 + 100(.05) = 105

We can convert this into a formula that will calculate the future value ("FV") for any given amount of money received immediately ("PV" for "present value") that can be invested at a given rate ("r").

PV + PV(r) = FV

This can be restated as PV(1 + r) = FV or as

$$PV = FV/(1 + r).$$

To reiterate, in this formula, PV is present value, FV is the amount to be received at some future point, r is some assumed rate of return you earn in a given time period. If you want to relate the present and future value of amounts over multiple time periods, we will need an additional variable - "n" for the number of time periods before you will receive the future value. Then,

 $PV = FV/(1 + r)^n$

This formula can be used to solve for PV where FV is known – that is, to answer the question of what is the value today of a promise to pay a given amount in the future. Alternatively, it can be used to solve for FV if what is known is what you have today to invest at a given rate.

The only term that really requires us to make a judgment call is r, the rate of return we think we could have earned while we're waiting to get paid. Really, we just have to pick an r that reflects some reasonable estimate of what we'd otherwise have earned – say, someone's projection for the future average rate of economic growth. This is often referred to as the "**opportunity cost**" for the delay in receiving the *FV*.

Thus, suppose you promise to give me \$100 in a year, and I have picked 5% as a reasonable estimate of r. (Note that you have to state your r in the same units as your n – so that if you pick

years as your period, you would state r in terms of an *annual* rate of return. If I pick 5%, I am assuming that, in one year, I will earn 5% of an initial investment as profit.) In that case, the value of your promise to me today is:

Again, the underlying logic is that it's better to have the money now if I can invest it and make some income during the time I would otherwise be sitting around waiting for it. Incidentally, note once again something about what the formula is telling us. We already know it tells us that \$100 in the future is worth less than \$100 today. But it also predicts what some payment today will be worth in the future. Continuing with the facts above, guess what I will get if I invest \$95.24 today and earn 5% on it for a year? I get exactly \$100!

Now, obviously, this whole exercise of time-value reasoning involves some speculation and guesswork. We can't know what the average rate of return over coming months or years will actually be, much less what our own, individual investment experience will be. If our assumed rturns out to be wrong, then so will our estimated present value. If it is less than the average actual return, then our estimate of present value was probably too high. For example, if we plugged in 5% for r, but the average rate of return in the economy turned out to be 7%, then the value on day 1 of a right to receive \$100 a year later is not \$95.24, which is what we estimated above. It's actually only \$93.46. That is, since it turns out that we could have earned even more than we thought, had we had the money in hand rather than waiting for it for a year, we ought to consider the value of getting it after a year to be even lower. On the other hand, if the economy does worse than we had expected in our initial calculation, our estimate would be too low. Since we couldn't actually have earned all that much in the interim while we had to wait for our payment, it wasn't actually such a big deal that we had to wait. (Say, for example, that actual returns were about 3% rather than 5%, in which case the present value of \$100 in a year would be \$97.09.) In fact, if the economy really tanks tomorrow and stays there for about a year, but then really picks up after that, it could even be better to have the money later than sooner.

There are a few other important points to make before we move on. First, the example in this section was simplified by the fact that the payment was to be made in one year, so n was 1. If the payment was to be made in two years, we would have had to actually deal with mathematical operations involving exponents. This is one of the reasons using a present value calculator is easier than doing a calculation by hand. Second, note that when n is 2 or higher, the formula accommodates the assumed (rational!) compounding of income on the investment. In other words, it assumes that the income foregone now by agreeing to accept payment in the future would be invested and that the amounts earned would be reinvested on an ongoing basis.

Finally, it may not be immediately obvious from the foregoing discussion, but it is easily understandable once it is pointed out, that if one expects that an investment of PV will produce the difference between FV and PV as a perpetually constant earnings stream ("PE") as a function of multiplying PV by r, and one knows what PE is, one can easily calculate PV in order to answer the question, how much would someone be willing to pay for a stream of earnings in the future? The formula is

PV = PE/r.

This is because we already know that we believe PV(r) = PE. Therefore, if someone offers to pay me \$5 per year in exchange for my investment today, how much am I willing to invest? If I know that what I could make elsewhere is a 5% return on my investment (my opportunity cost), it means that I should be willing to pay \$100.

 $PV = \frac{5}{.05} = 100$

That may feel a bit like inventing the wheel, but it is, in part, what those "other investors" are supposed to be thinking about in deciding how much to pay in establishing market price. (One of the other things they should be thinking about is just how to incorporate the risk that the payer of the income stream may default – but we will leave that to a class on corporate finance.)

4. Other Valuation Tools

Armed with the insight of the time-value concept, we are ready to turn to (or, at any rate, acknowledge the existence of) a few other approaches to valuation.

Capitalized earnings. This method calculates the net present value of expected future profits. If one assumes that the most recent year's income (or average of some number of recent years' income) fairly represents what a company will earn in the future (and thus that earnings will perpetually be constant), one simply divides that amount (what we were calling "*PE*" above) by the **discount rate** (also known as the "**capitalization rate**" – what we were referring to above as "*r*").

F Corp.'s net income last year was \$50,000,000 and there is no particular reason to think it will change in the future. The rate of return that would be demanded for similarly risky investment is 10%. The capitalized earnings method suggests that the entirety of owners' equity should be valued at \$500,000,000. The value per share would be established by dividing by the number of shares outstanding.

Capitalized cash flow. This method simply substitutes "**free cash flow**" for net income. Free cash flow is operating cash flow minus the amount required for capital expenditures to maintain and expand its asset base. This calculation is generally regarded as of more interest to investors than the capitalized earnings method.

Capitalized earnings (or cash flow) assuming growth. If you assume that an income stream will not be constant, but will increase at a constant rate every year, the stream may be valued as follows:

$$PV = A/(r-g)$$

Our new variable "A" is the amount to be received at the end of the first year, and "g" is the assumed growth rate.

G Inc. has increased its earnings by 10% per year in each of the last 3 years and is expected to continue to do so. Its earnings last year were \$10,000,000, which means its expected earnings this year are \$11,000,000. The assumed *r* is 8%.

PV = \$11,000,000/(.08 - .03) = \$11,000,000/(.05) = \$220,000,000, so G Inc.'s shareholders' equity might be valued at that amount.

This may be compared to the capitalized earning method assuming no growth:

PV = \$11,000,000/(.08) = \$137,500,000

Net present value. This is a method for valuing projects, as opposed to corporate stock or some other passive investment. It calls for calculating the present value of expected receipts and the present value of expected outlays and netting the two.

There are, of course, a number of other methods of valuation that you would learn about in a class on corporate finance.

5. Distributions and Valuation

You may have noticed that although we mentioned money received in Part 3, most of the examples in Part 4 did not. Although reasonable people may differ, modern finance theory seems to converge on the idea that earnings that may be retained by a firm are equivalent, for valuation purposes, to earnings that will be distributed. Certainly, some investors will make investment decisions taking into account whether they will receive a predictable stream of cash. Nonetheless, it is generally assumed that investors who want cash can simply sell their investments to those who don't care and those who don't care about cash will reinvest it.

B. Capital Structure

A sole proprietor of a strictly service business – say a "fix-it" person who uses the owner's tools – might succeed in starting a business without putting money at its disposal. (Not that such a choice necessarily would be advisable, given the possible advantages of advertising and carrying insurance.) Otherwise, businesses must raise money in order to commence and carry on operations. After a business has existed for a time, some of its needs may be satisfied from its earnings. Otherwise, those needs must be filled (in our simplified world) either with debt that must be repaid to creditors or equity contributions (including earnings that are not withdrawn) by owners. We will refer to the mix of a firm's debt and equity as its "**capital structure**." Different capital structures can trigger different results for control of the company, and different effects under tax and securities laws. These effects can change over time, and firms may make conscious choices about ways to alter capital structure in order to make it more advantageous.

In this section, we are two of the purely financial consequences of capital structure. We start with the concept of **leverage**.

1. Leverage

Leverage is, quite simply, making money with borrowed funds. It presupposes that you can earn more than you are required to pay in interest on the borrowing, and it also presupposes that you are taking into account all the other things that you really should. For instance, let's say that you know you can borrow an uncollateralized \$10,000 from a bank at an interest rate of 5% and loan it to a company that is offering 10%. Should you borrow the money and make the loan? This seems like a no-brainer until we add the information that you have \$10,000 worth of credit-card debt with an interest rate of 15%. It almost certainly would be a better idea to pay off the credit-card debt than to make the investment.

Before bank borrowing, your cash outlay is (\$1,500).

After bank borrowing and assuming the loan to the company, your cash outlay is 2,000 (1,500 + 500) and your cash receipts are 1,000, for net cash outlay of (1,000) – an improvement.

Still, if you forewent the loan to the company and used the bank borrowing to pay off your credit card debt, you cash outlay drops to (\$500).

Next, let's say that you have no credit-card debt after all. We still need to consider just why the company is offering you an interest rate that is higher than the one the bank is charging you to borrow. You guessed it – it probably is because your credit rating is better than the company's. If you go ahead and borrow the money and make the loan, you are facing a risk of non-payment by the company and may be in the position of having to pay back the bank from some other source. This may be a risk you are willing to take – and it is one you are being paid to take by the extra 5% – but it is something to think about quite seriously.

Suppose, however, that the bank is loaning you money at 5% simply because it is unaware that the company would be willing to pay 10%. On the flip side, the company is offering you 10% because it is unaware that a bank would loan it money at 5%. In the (unlikely) event that this were true, you would be described as taking advantage of **arbitrage**. It generally is believed that opportunities to arbitrage will be relatively short-lived, and not have significant effects on financial markets in general, for obvious reasons.

Now, change your assumptions entirely. You are the sole owner of a corporation. You are confident that if the corporation has \$500,000 of funding it will be able to produce a reliable income stream of \$100,000 per year (a return of 20%). You have \$500,000 but believe the corporation could borrow \$400,000 at 5%. Should you invest only \$100,000? If you do, only \$20,000 of the income will need to be paid in interest, leaving \$80,000 as a return on your investment of \$100,000. That's 80%! This again seems like a no-brainer until we ask what you would be able to do with your other \$400,000. Let's say the best alternative investment is putting the money in a bank at a return of 4% (\$16,000 a year). Your entire \$500,000 then will be making \$80,000+\$16,000, or \$96,000. You actually would be better off foregoing the bank loan and investing the entire amount. The lesson of this hypothetical, of course, is that leverage only "works" with appropriate knowledge about opportunity costs.

Once again, make the assumption that if your corporation has access to \$500,000 it will produce income of \$100,000. This time, however, you only have \$100,000 to invest. The rest must be borrowed. Should you borrow the money yourself and invest it, or should you cause your corporation to borrow directly? The picture could very quickly become complicated if we started to ask questions about whether the interest could be deducted for tax purposes either way, whether you and your corporation each will be separately taxed, and, if so, whether the tax rates would be the same. Assume away those complications. (Feels great, doesn't it?) What we won't assume away, however, is the fact that the bank is unlikely to loan money to a start-up corporation without a personal guarantee from the owner. This means that, from a personal liability standpoint, you are indifferent to whether you or the corporation takes out the loan, and it also means that the (5%) interest rate should be no different depending on the identity of the borrower.

Does the identity of the borrower make a difference to you from a financial standpoint? No, it does not. Either way, you have invested \$100,000 of your own money, the bank gets \$20,000 and you and/or your wholly owned corporation gets \$80,000. Thus, if the terms of entity debt and personal debt are identical, the capital structure of the firm should not matter because the owners can structure their own debt arrangements as they see fit. At least some theorists contend that if this is true in the case of the solely owned firm it should be equally true for one with multiple owners.

Finally, let's ask whether, if leverage can be such a great thing, it would make sense to have the corporation borrow the whole \$500,000. That would represent be a return of \$80,000 on your investment of \$0. Apart from the impossibility of dividing by zero to figure out what the return of return would be, this hypothetical prompts us to recognize the fact that if there is no equity and all financing is in the form of debt, the debt itself is equity. This is because from a financial standpoint, the difference between the two is simply that debt is paid first and thus is viewed as less risky. It therefore carries a return that is predictably less than the return on equity. Presumably, the bank would recognize this, and change the cost of the interest charged accordingly.

The last thought experiment described above is regarded as one of the great breakthroughs of modern finance, insofar as it suggests that changing the percentage relationships of debt and equity changes the gross return payable to equity holders, but also inevitably affects the risk of the equity investment. This permits the conclusion that asset values (what is purchased with debt and/or equity) remain constant, even as equity value may fluctuate. For our purposes, this means that many finance theorists believe a firm *as a whole* cannot be made more profitable by the relative amount of debt taken on, although the return on equity can fluctuate (with a corollary risk adjustment).

2. Taxes and Other Warts

The hypotheticals described above blithely disregard the possible effects of two-tier taxation, differing tax rates for equity owners and corporations, and other little bits of reality – including the real-world costs of capital raising in the form of either debt or equity. The Tax Considerations section of this module goes into two-tier taxation and tax rates in some depth, although it does not attempt to relate them to the subject of leverage. We will, however, note at

this point that interest paid by a firm is deductible for tax purposes, while dividends paid are not. Both interest and dividends received are taxable to the recipient. (We here are using "dividends" to mean distributions to shareholders to the extent of retained earnings. Distributions of paid-in capital – "returns" of capital – are neither deductible by the corporation nor taxable to the recipient.) All other things being equal, the deductibility of interest is a "win" for the firm taxable as a separate entity, as it reduces the amount that must be paid to the tax authorities.

IV. Tax Considerations

The background on federal income taxation provided in this section should be more than enough to get you through any basic course on business organizations. (In the event you were to decide to become a business practitioner, you would want the specialized information in an additional two or three tax classes – or access to a partner who specializes in tax.) Obviously, tax rates and other details change, so our coverage is quite general and our assumed rates are artificial. Special note should be taken of the areas where we suggest change is likely.

In General

Federal income taxation is purportedly "progressive." This means that higher income is supposed to be taxed at higher rates than lower income. Owing to careful tax planning and the availability of certain loopholes this is not always the case in practice, but as a theoretical matter it is true.

Progressive taxation is accomplished by taxing increments of income at progressively higher "marginal" rates. The first X dollars that anyone earns, no matter how much is earned in total, is taxed at the same rate. The next Y dollars is taxed at a higher rate, but the rate paid on the first X dollars is unchanged. The next Z dollars is taxed at a higher rate still, without changing the rates paid on the X and Y dollars. X, Y and Z are tax "brackets" and the rates applicable to them are referred to as "marginal" rates. It is usual to describe a taxpayer by referring to the highest marginal rate applicable.

If the tax rate on the first \$10,000 is 5% and the tax rate on the next \$10,000 is 10%, someone who earns \$20,000 will pay \$1500: ($$10,000 \times .05$) + ($$10,000 \times .10$) = \$500 + \$1,000

To put it another way, moving into the next tax bracket affects only the last increment of income.

A taxpayer's "effective" tax rate equals the total amount of tax paid as a percentage of total income. In other words, the calculation is Tax Paid = x(Income) or Tax Paid/Income = x. You do not add the marginal rates nor do you average them.

Returning to the last example, the taxpayer pays \$1500 of tax on income earned of \$20,000. \$1500 is not 15% (which would be the number if you added 5% and 10%) of \$20,000; instead it is 7.5%. In this example, 7.5% does happen to be the average of 5% and 10%. If, however, the taxpayer earned only \$15,000, the tax paid would be \$1,000. (5% of 10,000 and 10% of \$500). That means the effective tax rate is 6.7% (\$1000/\$15,000).

There are different tax rates applicable to ordinary "earned" income and to income derived from "capital gains" transactions. Assume that we are talking about Terry, an individual taxpayer. Terry earns \$50,000 as a mid-level paper-pusher. In addition, Terry receives \$100,000 for selling a piece of property purchased two years ago for \$50,000, netting a gain of \$50,000. The income Terry earns from employment will be taxed at a higher rate than the rate at which the amount gained from the sale of property will be taxed. Thus, there is different, more favorable, treatment for gain on the sale of assets held for a minimum period for investment or to produce income. These assets can include securities, rental properties, etc. This is, quite straightforwardly, an attempt to encourage people to make investments and hold them for a minimum period.

How are gains (or losses) on sales calculated? This is fairly intuitive. The difference between what you "get" for an asset (which can include someone else's promise to pay off the debt you incurred to purchase it in the first place) and what you "paid" (which can include both what you paid in cash and what you promised to pay) is your gain or loss on sale. The amount you paid is called your "basis."

In Terry's example, Terry's basis was \$50,000.

Assume Betty buys Blackacre. To do so, she pays 50,000 of her own cash and executes a promissory note for 50,000 payable to Blackacre's former owner. Her basis is 100,000. A few years later, she sells Blackacre for 75,000 and a promise to pay off her remaining debt, now reduced to 330,000. Betty's gain is (75,000 + 330,000) - 100,000 = 5,000.

As of this writing (and subject to possible change), the basis of an heir in inherited property is "stepped up" to fair market value at the date the decedent died. Mostly because of the administrative difficulty of figuring out when a decedent bought property and how much he or she paid, inherited property simply is assumed to have been purchased at its fair market value when inherited.

Assume Gerry bought Greenacre in 1990 for \$100,000, including debt that Gerry paid off. Gerry dies in 2017, leaving the property to a grandchild. The property has a fair market value in 2017 of \$500,000. The grandchild promptly sells the property for \$500,000. No tax whatever is due.

Corporate Tax Considerations

Tax rates are different for corporations than they are for individuals. Sometimes corporate tax rates are higher than individual tax rates, sometimes they are lower, and sometimes (at least in some brackets) they are pretty much the same. Periodically, some economist or politician proposes to eliminate corporate tax rates entirely. The relative rates prevailing at a given time affect choices that are made about whether to form corporations or use other business entities.

Money earned by a corporation and paid to shareholders with respect to their shares is taxed at both levels. Let's start by acknowledging some exceptions: what we are saying in this paragraph is not true with respect to "Subchapter S" corporations (covered below) or some inter-corporate

dividends (which are beyond the scope of this module). Exceptions aside, the general rule results in what is called "two-tier taxation."

Assume that C Corp. earns \$50,000 which is subject to tax at a rate of 10%, or \$5,000. This leaves \$45,000. Assume that C Corp. immediately distributes all \$45,000 to Candy, its only shareholder. If Candy also is subject to tax at a rate of 10%, she will pay \$4,500. The total taxes paid are \$9,500, for an effective tax rate of 19% (\$9,500/\$50,000).

Although not always true, as of this writing, "qualified" dividends received from corporations are subject to the capital gains rate rather than the earned income rate. This partially mitigates the severity of two-tier taxation. "Qualified" dividends, for our purposes, are those paid by corporations with respect to shares that have been held a minimum specified period of time.

Amounts paid as ordinary and necessary business expenses are deductible, meaning that there are methods that may be lawfully available for minimizing the effect of two-tier taxation. Note that the two-tier rule applies to amounts paid to shareholders "with respect to their shares." Consider, instead, a payment of salary to a shareholder who legitimately is employed by the corporation in which the shareholder holds shares. The salary will be ordinary earned income to the recipient, but it will be deductible by the corporation as an ordinary and necessary cost of doing business.

Assume Candy is employed by C Corp. and is paid the \$50,000 fair market value of her services. If C Corp. otherwise would have had \$50,000 in earnings, they will be eliminated (or "zeroed out") by the payment to Candy. C Corp. will pay no taxes and Candy will pay \$5,000 (10% of her earned income).

Ordinary and necessary business costs also include interest on money borrowed and rent on property leased. Thus, if shareholders loan reasonable amounts of money to corporations at interest rates that also are reasonable, the money paid in interest will be deductible by the corporation and subject to tax only when it is received by the shareholder/lender. The same would be true for reasonable amounts paid for property needed by the corporation and owned by a shareholder.

Do note the emphasis on being reasonable (the old saying is that "Pigs get fat, hogs get slaughtered.") Note, too, that if not all shareholders work, have money to lend, etc., the "zeroing out" strategy may not be as attractive to some shareholders as to others.

Another strategy for mitigating the effect of two-tier taxation is the "accumulation/bail-out strategy." This strategy leverages the difference between earned income and capital gains rates and is less important when qualified dividends are taxed at corporate gains rates. The idea is that, if shareholders have no immediate need for dividends, they may encourage the directors to reinvest corporate earnings in the business. (Simply accumulating large amounts of corporate cash is problematic owing to something called the "accumulated earnings" tax.) The value of shares held will increase. When the shares are sold, there will be gain to the shareholder, taxable as capital gain.

The pinnacle of accumulation/bail-out achievement is to allow all corporate earnings to be reinvested and then die. The heir then receives a stepped-up basis of fair market value at the time of death and may sell the shares with no gain whatsoever. (This disregards, of course, any financial effects federal estate taxation may have, but many estates are entirely exempt from such taxation.)

There are times at which the corporate tax rate is significantly lower than the individual tax rate, especially in the lower tax brackets. In that case, earnings may be left in the corporation in the hope that individual tax rates will change. This strategy is somewhat constrained owing to accumulated earnings tax considerations. In addition or in the alternative, people sometimes form multiple small corporations to keep the advantage of the lower rates on lower brackets.

The Sub-Chapter S election is designed to eliminate two-tier taxation for eligible, electing corporations. A corporation that has not made the Sub-Chapter S election is known as a "C corp." A corporation making the election is known as an "S corp." The election is available only to corporations that have no more than 100 holders, only one class of stock (although stock can differ with regard to voting rights), no holders who are other than natural persons (with some exceptions), and no holders who are non-resident aliens. Income earned by an S corp. is taxed directly to its shareholders in proportion to their shares. Losses of an S corp. are passed through to its shareholders and may, subject to other limitations, be deducted to the extent of their basis in their shares. That basis includes amounts paid for shares, as well as past amounts passed-through for taxation to the shareholder. It is reduced by past distributions. It does not include any share of corporate debt, even if guaranteed by the shareholders.

The proprietors of S corps. may choose to pay themselves limited amounts as salaries in order to limit the amounts required to be paid in "payroll taxes." This is more colorfully described in the text at pages 39-40 and is a strategy to reduce Social Security and Medicare taxes, rather than federal income tax.

Assume that Candy causes C Corp. to file the Sub-Chapter S election. Assume further that she is the sole employee. The corporations earns \$100,000, but pays only \$50,000 to Candy. The rest is taxed to her as a shareholder. Candy will be required to pay (and the corporation will be required to withhold) Social Security and Medicare taxes only on the \$50,000 paid as salary.

Were no salary allocation made, and no self-employment taxes paid, the arrangement might be challenged by the taxing authorities as a sham.

Unincorporated Entities

Sole proprietorships are taxed as individuals. They also will have to pay "self-employment" taxes for Social Security and Medicare purposes.

Other unincorporated entities with only one owner may elect to be taxed as corporations or as "nothings," just as though they were sole proprietorships. This means that the entire income

of the entity would be treated as though it were salary for purposes of calculating self-employment taxes.

Unincorporated entities with more than one owner may elect to be taxed as corporations or may elect to be taxed as partnerships unless they are publicly traded, in which case they will be taxed as corporations. There is, however, an exception from the "public trading" rule for companies earning most of their money in exploration, development, or distribution of minerals or natural resources, including real estate.

If an entity is taxed as a partnership, its income will be calculated and reported by the entity, but not taxed to the entity. Instead, the income will be taxed to the partners in their allocated shares (and losses also will be allocated). This is referred to as "pass-through" taxation.

Assume that C Partnership earns \$50,000. The income will be reported by the partnership and allocated to the partners in accordance with their legal shares. Assume that all partners pay income tax at a rate of 10%. The total taxes paid will equal \$5,000.

Recall that when C Corp. was organized as a C corp. the total tax bill for the entity and its shareholders was \$9,500.

Grossly generalizing, partners (including LLC members) who essentially are general partners do have to pay self-employment taxes, but those who essentially are limited partners (including LLC members) do not. Losses passed through to a partner are deductible, and thus offset income from other sources, to the extent of the partners' basis. That basis includes amounts paid for the partner's interest in the partnership, past amounts passed through as income, less past distributions. It also includes allocable shares of partnership debt and liability (which is not true of the basis of shareholders in S corps.), although other restrictions on deductibility often apply. These restrictions require that partners be "at risk" with respect to the debt or liability in question and permit losses from passive activity only to offset gains from other passive activity. The nuances of these rules are beyond the scope of this module.

Depreciation is a non-cash expense that also is recognized as deductible for tax purposes. Assume that the main asset of the D LLC (which has elected to be taxed as a partnership) is depreciable real property acquired with debt guaranteed by each of the members of the LLC, all of whom are actively involved in management. Assume further that the depreciation deducted with respect to the LLC's property exceeds the income earned. The loss will be passed through to the members in their allocable shares and will be deductible to offset income from other sources.