1. For each of the following pairs, find a RE and FA that define $L_1 \cap L_2$
   (i). $(a + b)^* a (a + b)^*$
   (iii). Odd-length strings $a(a + b)^*$

2. Use the pumping lemma, show each are non-regular
   (i). $a^n b^{n+1}$
   (ii). $a^n b^n a^n$

3. Show the following FAs are equivalent:
   (i).

```
   x0  x1  a  b  a  b
   b   a   b

   y0  y1  y2
   a   b   a
   b
```

   (ii).

```
   x0  x1  x2  a  b  a  b
   b  a  b

   x2  x3  a  b
   b
```

4. Using the method of intersecting each machine with the complement of each other, determine whether two machines accept the same language (or not)
   (i).

```
   x2  x1  b  a  a  a
   b

   x0  x1
   a
```

   (ii).
5. Do the following FAs accept a finite or infinite language? Justify.

(i).

(ii).