Practice Problems -1

1. Textbook, Page 83, Exercise 1.4.

Draw **DFA** for:

(a) i. {*w*| *w* has at least three a's}

ii. {*w*| *w* has at least two b's}

iii. {*w*| *w* has at least three a's and at least two b's}

(b)   i. {*w*| *w* has exactly two a's}

ii. {*w*| *w* has at least two b's}

iii. {*w*| *w* has exactly two a's and at least two b's}

(c)   i. {*w*| *w* has an even number of a's}

ii. {*w*| *w* has one or two b's}

iii. {*w*| *w* has an even number of a's and one or two b's}

(d) i. {*w*| *w* has an even number of a's}

ii. {*w*| each a in *w* is followed by at least one b}

iii. {*w*| *w* has an even number of a's and each a is followed by at least one b}

(e) i. {*w*| *w* starts with an a}

ii. {*w*| *w* has at most one b}

iii. {*w*| *w* starts with an a and has at most one b}

(f)   i. {w| w has an odd number of a's}

     ii. {w| w ends with a b}

     iii. {w| w has an odd number of a's and ends with a b}

(g)   i. {w| w has even length}

     ii. {w| w has an odd number of a's}

     iii. {w| w has even length and an odd number of a's}

2. Textbook, Page 84, Exercise 1.7. Draw **NFA** for:

  (a) The language {w| w ends with 00} with three states
  (b) The language {0} with two states
  (c) The language $0^*1^*0^+$ with three states
  (d) The language $1^*(001^+)^*$ with three states
  (e) The language {ε} with one state
  (f) The language 0^* with one state

3. Write the **RE** for:
  (a) {w| w begins with a 1 and ends with a 0}

  (b) {w| w contains at least three 1s}

  (c) {w| w contains the substring 0101, i.e., $w = x0101y$ for some x and y}

  (d) {w| w has length at least 3 and its third symbol is a 0}

  (e) {w| w starts with 0 and has odd length, or starts with 1 and has even length}

  (f) {w| w doesn't contain the substring 110}