9. $\delta(A, x) = B$ iff w has an odd # of '1's because:
   - Reason: The induction hyp. states that if x has an odd # of '1', we're in B
   - (A)

10. $\delta(A, w) = B$ iff w has an odd # of '1' because:
   - Reason: Given $\delta(A, x) = B$ & $w = x0$, the transition function keeps us in B on input '0'
   - (B)

4. (a) 1. Start with a DFA for regular language since every regular language can be represented by a DFA
   2. Transform the DFA → ε-NFA by
      - Adding new start state with a single ε-transition to the original start state
      - For each state, ensure that for each input symbol, there is only 1 transition out of that state. If a state has >1 transitions for the same input, introduce intermediate states w ε-transitions to separate these transitions
      - If there are multiple accept states, add ε-transitions from each to a new, single accept one

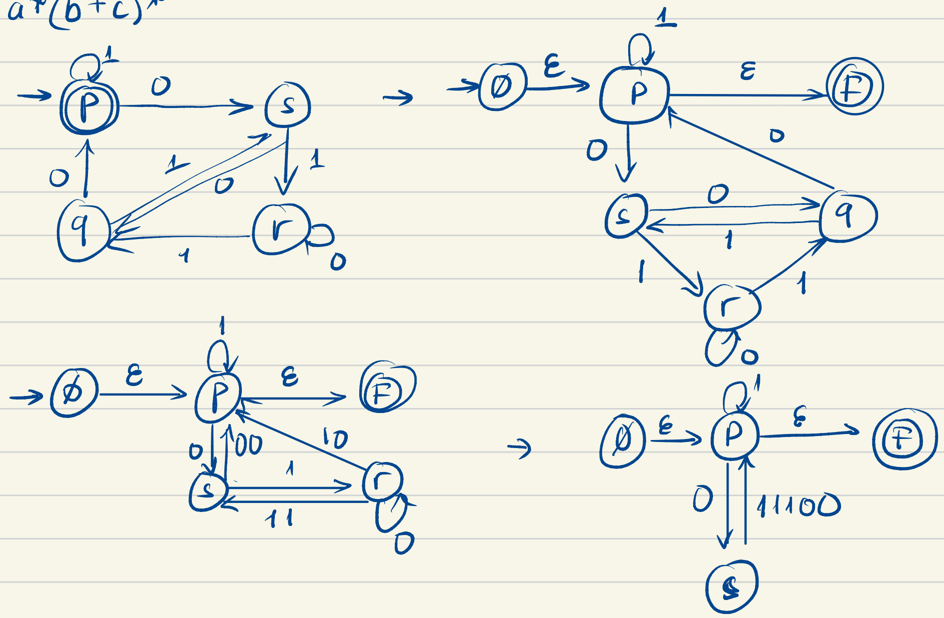
   (b) 1. from a DFA of regular lang, create a chain of states in the ε-NFA where each state has an ε-tran. to the next state
   2. At each state, include 1 non-ε-tran that corresponds to the transition in the DFA for the current input symbol
   3. When the DFA would transition to a new state on an input symbol, the ε-NFA transitions on that symbol to a new state in the chain, which then ε-transitions to the next state in the sequence, simulating DFA's computation
   4. The accept states of the DFA correspond to states in the ε-NFA chain that will ε-tran to a new accepting state

5. b. (0|1)*1(0|1){9}$
   c. ^(0*10*1)?0*$

6. a. ^0*10*10*1*$
   b. ^(1*01*01*01*01*01*)*$

7. $a^*(b+c)^*$

8.



$1 + 0((0+10^*1)1)^*(0+10^*1)0$

answer