1. Here is an $\varepsilon$-NFA. Convert it to a DFA and find all of the strings of length 2 accepted by it. $S$ is the start state.

![Diagram of an $\varepsilon$-NFA with states S, T, and U, transitions labeled a, b, c, e, and 1.

2. Design an $\varepsilon$-NFA for the set of strings consisting of either 01 repeated 1 or more times or 010 repeated 1 or more times.

3. Give a regular expression for the set of strings over the alphabet \{a,b,c\} containing at least one a and at least one b.

4. Give a DFA for the set of strings with an even number of zeros.

5. Give a regular expression for the set of strings with an even number of zeros.

6. Describe in English the language denoted by the regular expression $(1+\varepsilon)(00^*1)^*0^*$.

7. Suppose we have a finite automaton with no transitions into the start state and none out of the final state. This automaton accepts language $\mathcal{L}$. If we modify the automaton by adding an $\varepsilon$-transition from the final state to the start state, what language will it accept?

8. Convert the regular expression $(0+1)(01)^*$ into an $\varepsilon$-NFA using the construction we developed in class.

9. Convert $(1+\varepsilon)(00^*1)^*0^*$ into an $\varepsilon$-NFA any way you wish.

10. Convert the following DFA into a regular expression using the construction we developed in class. $S$ is the start state.

![Diagram of a DFA with states S, T, and U, transitions labeled 0, 1, and 1.

Due in class Friday, February 23
Again, you can do this one on paper if you do it neatly and legibly.