Do each problem on a separate set of pages and please remember to write your name, net-id and problem number on the top right hand corner of each page.

1. Problem 3.2.6, all four parts.

2. Problem 4.2.9.b. *Hint:* You have to somehow predict the set of reachable states from somewhere. But you also must make sure that the predictions are correct.

3. We define a new type of NFA, that we call all-NFA. In this, we can have non-deterministic and $\varepsilon$-transitions, but now, a string $w$ is accepted only if **every** path from the start state on $w$ leads to an accepting state. Prove that the set of languages accepted by all-NFA are exactly the regular languages.

4. Write out the regular expression for the following language:

$$L = \{ w \mid w \in \{0, 1\}^*, \#1(w) \text{ and } \#0(w) \text{ even } \}$$

where $\#1(w)$ is the number of 1’s in the string $w$. 