1. Consider the alphabet $\Sigma = \{0, 1\}$ and the languages
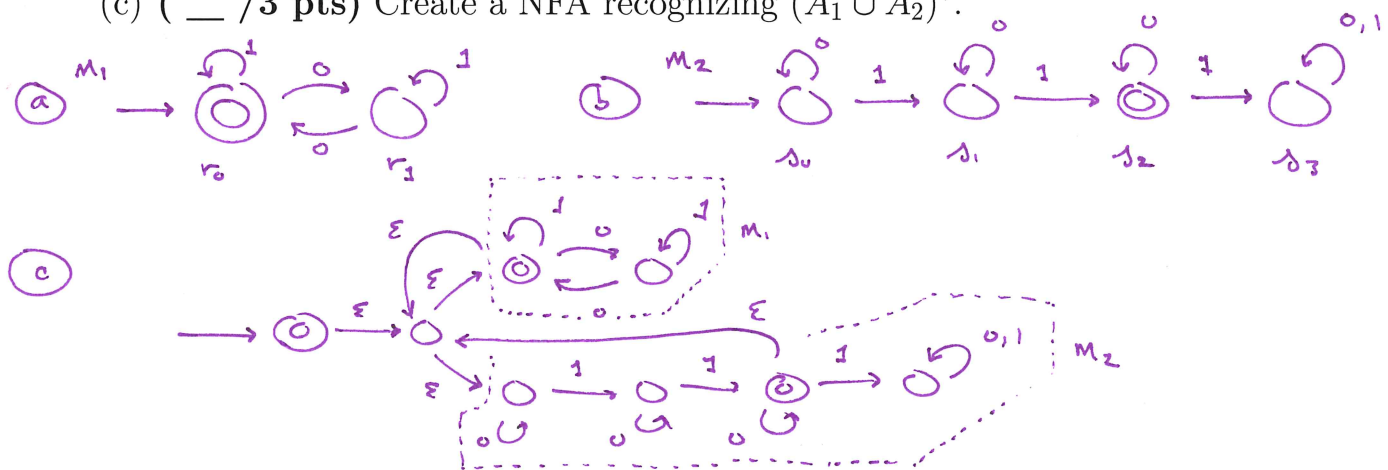
$$A_1 = \{w \mid w \text{ contains an even number of 0s}\},$$
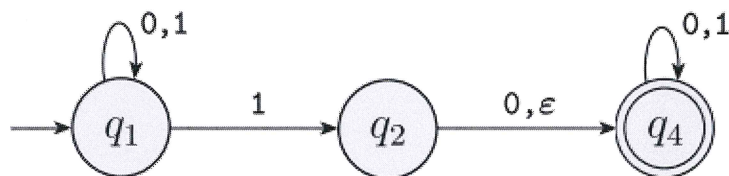$$A_2 = \{w \mid w \text{ contains exactly two 1s}\},$$

(a) (__ /1 pt) Create a DFA recognizing A_1.

(b) (__ /1 pt) Create a DFA recognizing A_2.

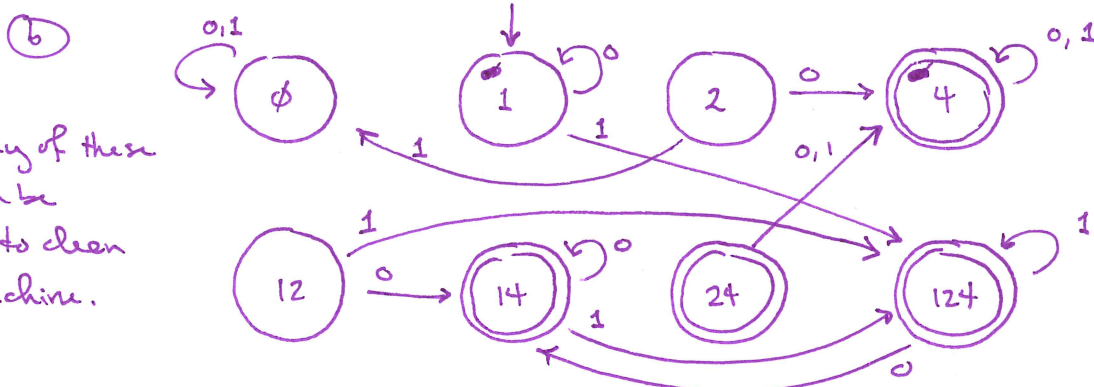(c) (__ /3 pts) Create a NFA recognizing $(A_1 \cup A_2)^*$.

2. Consider the alphabet $\Sigma = \{0, 1\}$ and the NFA, N, given below.

(a) (__ /1 pt) Explain why N accepts the string 0011.

(b) (__ /4 pts) Convert N into a DFA.

(a) Consider the following possible sequence of visited states: $q_1 \overset{0}{\;} q_1 \overset{0}{\;} q_1 \overset{1}{\;} q_1 \overset{1}{\;} q_2 \overset{\varepsilon}{\;} q_3$

(b)

NOTE: Many of these states can be removed to clean up the machine.