Prob. 1	Prob. 2

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Problem 1.

This is a simple DFA. The E states are reached with an even number of 0s while the O states are reached with an odd number of 0s. Only the E states are accepting. The first 1 in the input will switch from E_1/O_1 to E_2/O_2, and the second one will go to F, which is the failure state since more than one 1 has been detected.

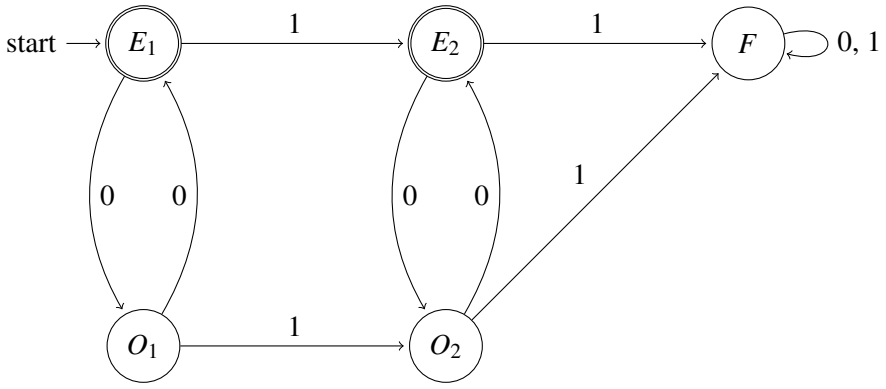

Figure 1: Problem 1 DFA

Problem 2.

By using Observation 6 from the lecture notes we can deduce:

$$\forall x \in \Sigma^* : \hat{\delta}(q_0,x) \in F \Rightarrow \hat{\delta}(q_0,x) \notin \overline{F} \therefore\ x \in L(M) \rightarrow x \notin L(\overline{M}).$$
$$\forall y \in \Sigma^* : \hat{\delta}(q_0,y) \notin F \Rightarrow \hat{\delta}(q_0,y) \in \overline{F} \therefore\ y \notin L(M) \rightarrow y \in L(\overline{M}).$$

Therefore, $L(\overline{M}) = \Sigma^* - L(M) = \overline{L(M)}$