

You have to use the designated spaces for your answers. No extra pages will be provided.

**Problem 1: Designing DFAs (10 points)**

Let  $\Sigma = \{0, 1\}$ . Consider the following languages over  $\Sigma$ .

$$L_1 = \{0, 10\}$$

$$L_2 = L_1^*$$

$$L_3 = \{w : \text{the length of } w \text{ is four}\}$$

- (a) Write down all the strings in  $L_2 \cap L_3$ . (2.5 points)
- (b) Give the state diagram for a DFA that recognizes  $L_1$ . (4.5 points)
- (c) Give the state diagram for a DFA that recognizes  $L_2$ . (3 points)