

Name: _____

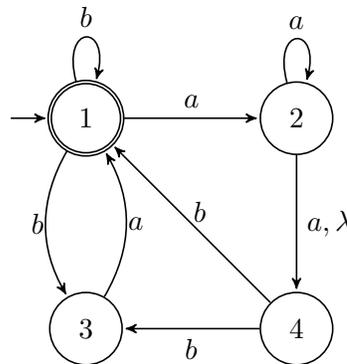
Directions: Show all work. No credit for answers without work.

1. [2 points] Let $\Sigma = \{0, 1\}$ and

$$A = \{w \in \Sigma^* : w \text{ contains } 000 \text{ or } 010 \text{ as a substring}\}.$$

For example, $010 \in A$ but $0110 \notin A$. Construct an NFA for A with at most 4 states.

2. [3 points] Convert the following NFA to a DFA.



3. Let $\Sigma = \{a, b\}$ and let

$$A = \{w \in \Sigma^* : \#a(w) \text{ is not a multiple of } 3\}$$

$$B = \{w \in \Sigma^* : \#b(w) \text{ is even}\}.$$

(a) [**3 points**] Give an NFA for the concatenation language AB .

(b) [**2 points**] Give a DFA for AB . Simplify your machine.