1.6 Give state diagrams of DFAs recognizing the following languages. In all parts the alphabet is \{0, 1\}

a. \( \{ w \mid w \text{ begins with a } 1 \text{ and ends with a } 0 \} \)

b. \( \{ w \mid w \text{ contains at least three } 1s \} \)

c. \( \{ w \mid w \text{ contains the substring } 0101, \text{i.e., } w = x0101y \text{ for some } x \text{ and } y \} \)

d. \( \{ w \mid w \text{ has length at least } 3 \text{ and its third symbol is a } 0 \} \)

e. \( \{ w \mid w \text{ starts with } 0 \text{ and has odd length, or starts with } 1 \text{ and has even length} \} \)

f. \( \{ w \mid w \text{ doesn’t contain the substring } 110 \} \)

g. \( \{ w \mid \text{the length of } w \text{ is at most } 5 \} \)

h. \( \{ w \mid w \text{ is any string except } 11 \text{ and } 111 \} \)

i. \( \{ w \mid \text{every odd position of } w \text{ is a } 1 \} \)

j. \( \{ w \mid w \text{ contains at least two } 0s \text{ and at most one } 1 \} \)

k. \( \{ e, 0 \} \)

l. \( \{ w \mid w \text{ contains an even number of } 0s, \text{ or contains exactly two } 1s \} \)

m. The empty set

n. All strings except the empty string