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

a) \{w | w begins with a 1 and ends with a 0\}

d) \{w | w has length at least 3 and its third symbol is a 0\}

f) \{w | w doesn’t contain the substring 110\}

h) \{w | w is any string except 11 and 111\}

i) \{w | every odd position of w is a 1\}

1.36 Let \(B_n = \{a^k | k is a multiple of n\}\). Show that for each \(n > 1\), the language \(B_n\), is regular. (\(\Sigma = \{a\}\) and \(a^k\) means a string of \(k\) \(a\)’s. \(n\) is an integer.)

• Let \(A_n = \{(a^n b^n)^k | k \geq 1\}\). Show that for each \(n \geq 1\), the language \(A_n\), is regular.

• \(x\) is a prefix of string \(y\) if a string \(z\) exists where \(xz = y\). Let \(A\) be a regular language and let \(L_A = \{x | \exists a\ string z\ such\ that\ xz \in A\}\). Prove that \(L_A\) is regular.

• Proving methods