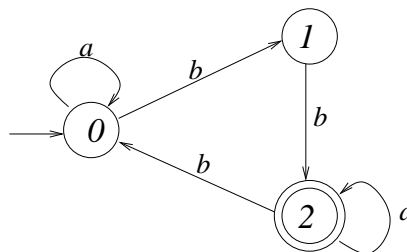


- Write a regular expression for each of the following languages over $\{0, 1, 2\}$:
 - the set of all words that start with a 0 or a 1, end with a 2, and have 201 as a subword,
 - the set of all words containing at least three consecutive 2's,
 - the set of all words of odd length.
- For each of the following regular expressions, describe in English what is the language defined by the expression:
 - $(a^*b^*)^*$
 - $(a + b)^*b(a + b)(a + b)(a + b)$
- Given the following regular expression E

$$(1 + \varepsilon)(0 + 01)^*$$

construct an ε -NFA A such that $L(A) = L(E)$. (Intermediate steps are required.)

- Given the following DFA A , obtain an equivalent regular expression using the state elimination technique. (Intermediate steps are required.)



- Give a CFG for each of the following languages:
 - $L_1 = \{0^{i+2}1^i \mid i \geq 0\}$
 - $L_2 = \{a^ib^j \mid 0 \leq i < j\}$
 - L_3 is the set of all strings over the set of symbols '(' and ')' such that '(' and ')' are well paired and nested. For example, '((()))', '((((())))', and '((((((()))))))' are all words in L_3 .
 - $L_4 = \{0^m1^{m+n}0^n \mid m, n \geq 0\}$