

$$(0 \ U \ 1)^* \ 0 \ (0 \ U \ 1)^* \ 0 \ (0 \ U \ 1)^*$$
$$(0 \ U \ 01)^*$$
$$(0 \ U \ 10)^* \ 11 \ (0 \ U \ 01)^*$$
$$(0 \ U \ 01)^* \ U \ (0 \ U \ 10)^* \ 11 \ (0 \ U \ 01)^*$$

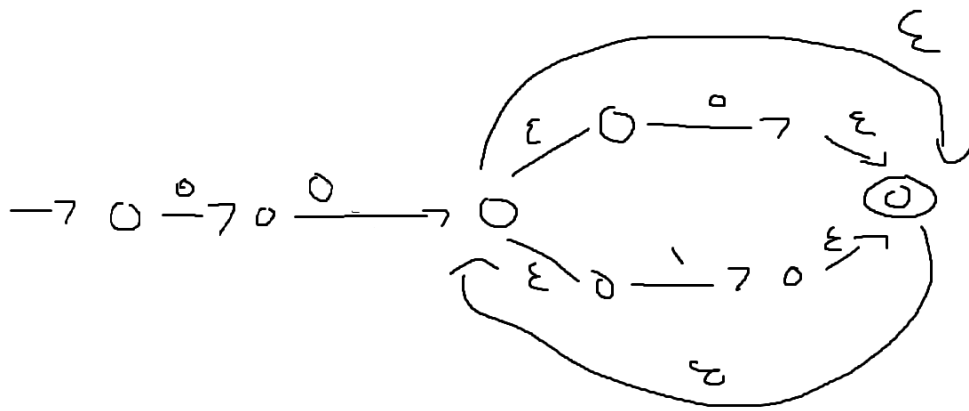
3b. A string that ends with a 1 in the second to last position or a 1 that in the third to last position.

Diagram illustrating the construction of a DFA for the regular expression a^*b^* . The DFA consists of states q_0, q_1, q_2, q_3, q_4 and transitions labeled with a and b . The transitions are:

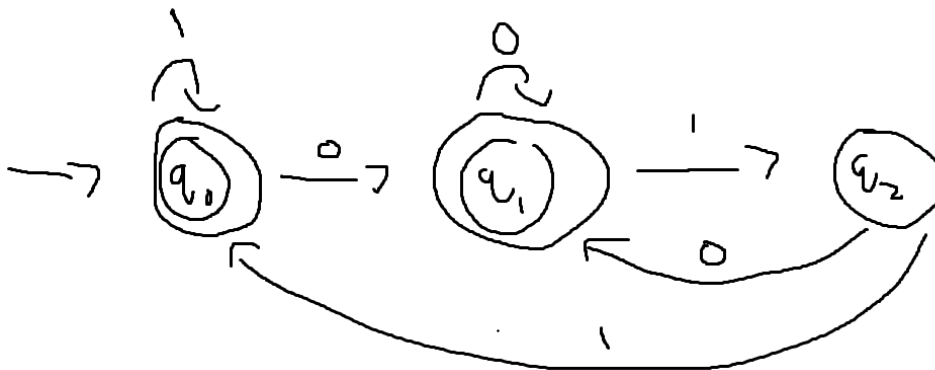
- $q_0 \xrightarrow{a} q_1$
- $q_1 \xrightarrow{a} q_1$ (self-loop)
- $q_1 \xrightarrow{b} q_2$
- $q_2 \xrightarrow{b} q_3$
- $q_3 \xrightarrow{b} q_3$ (self-loop)
- $q_3 \xrightarrow{a} q_4$
- $q_4 \xrightarrow{a} q_4$ (self-loop)
- $q_4 \xrightarrow{b} q_4$ (self-loop)

The DFA starts at q_0 and ends at q_4 , which is the final state.

4b.



5.



6.

$$1^*(0 \cup 011)^*(0 \cup \epsilon)$$