Student Information

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Question 1

Design a Turing machine which recognizes the language $L = 0^N 1^N | N \geq 1$.
$\Sigma = \{0, 1, \sqcup\}$, means that you cannot write any other symbol than these symbols.

Solution:
Descriptions for the states:

- State 0 (Initial state): If the tape head is on a 0, changes it with a blank space, moves the tape head to right, and passes to the state 1. If it is on a blank space, passes to the acceptance state.

- State 1: This state's task is finding the right end of the string. After finding the rightmost character in the string, the machine passes to state 2.

- State 2: If the tape head is on a 1, changes it with a blank space, moves the tape head to left, and passes to the state 3. If it is on a blank space, passes to the acceptance state.

- State 3: This state's task is finding the left end of the string. After finding the leftmost character in the string, the machine passes to state 0.

Note that in these descriptions, undefined transititons leads to rejection of the string.

Figure 1: Turing machine which recognizes the language $L = 0^N 1^N | N \geq 1$
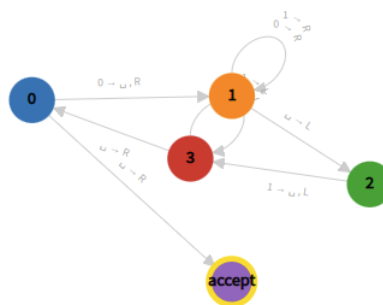
Sample inputs:
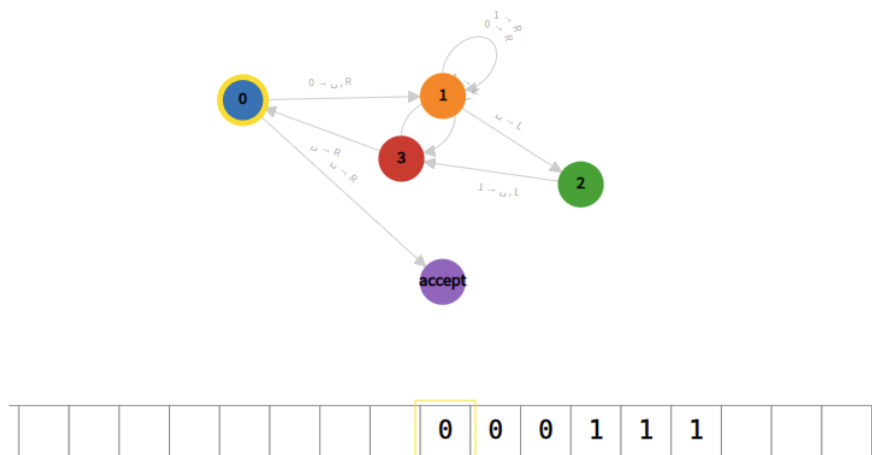
12cm

Figure 2: Input = 000111
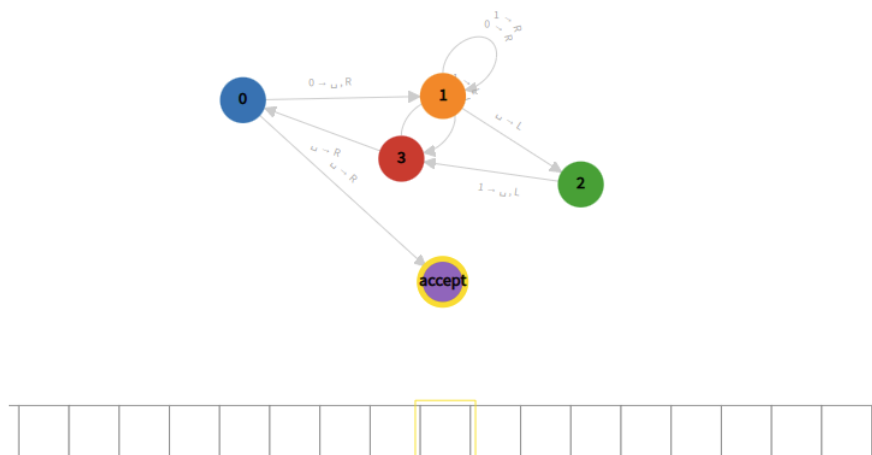

Figure 3: Input = 000111, Output = Accepted
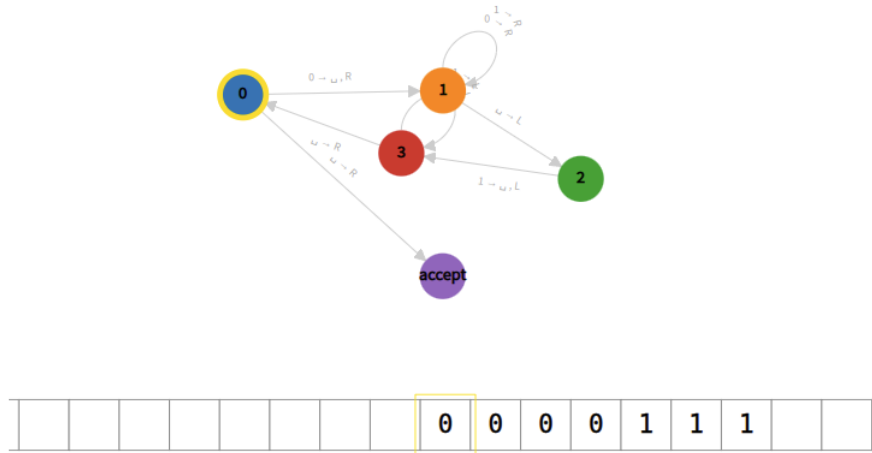
Figure 4: Input = 0000111

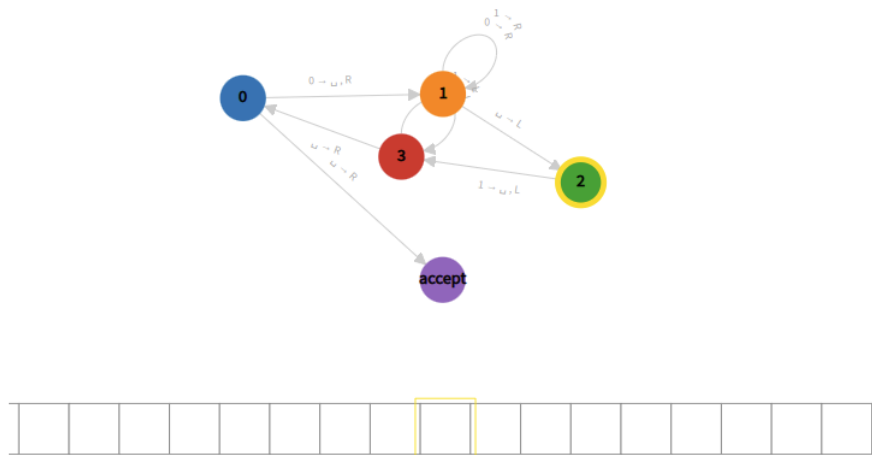Figure 5: Input = 0000111, Output = Rejected
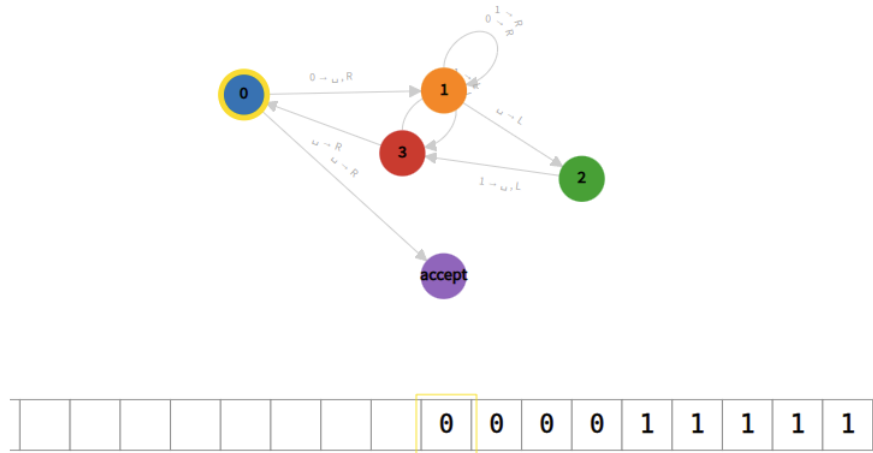
Figure 6: Input = 000011111

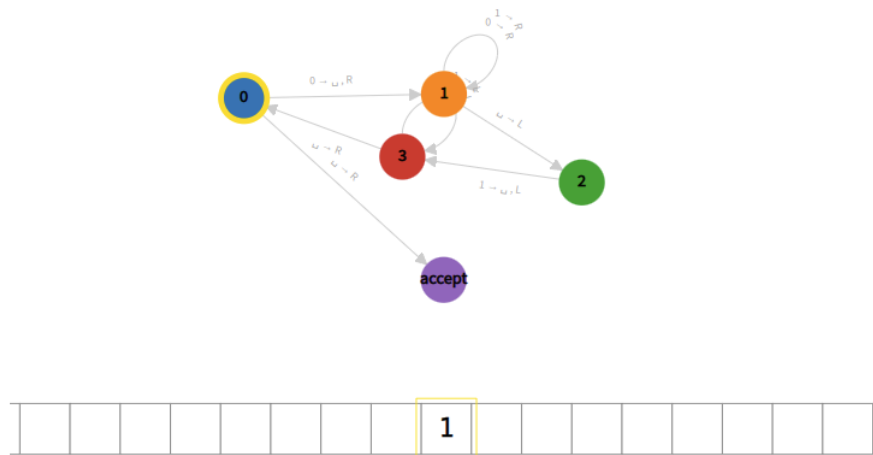Figure 7: Input = 000011111, Output = Rejected
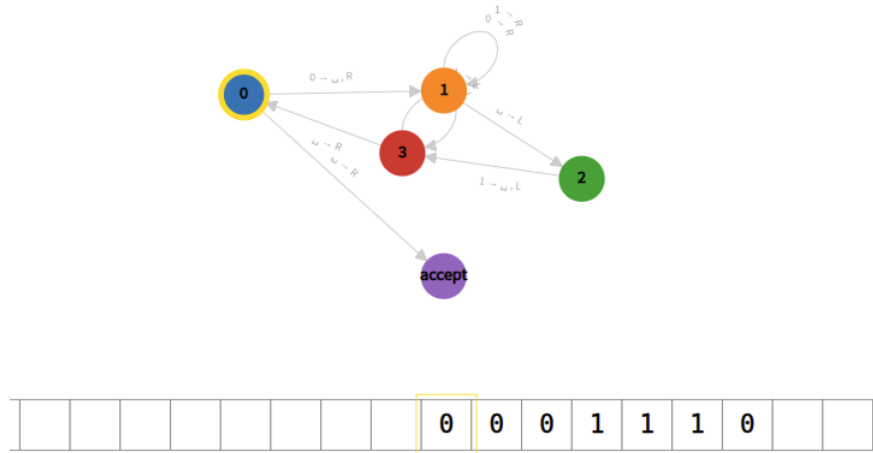

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Figure 8: Input = 0001110

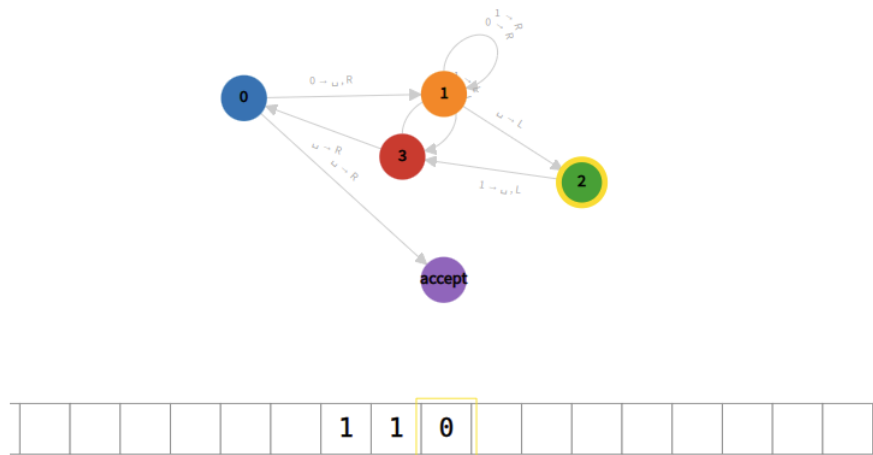Figure 9: Input = 0001110, Output = Rejected
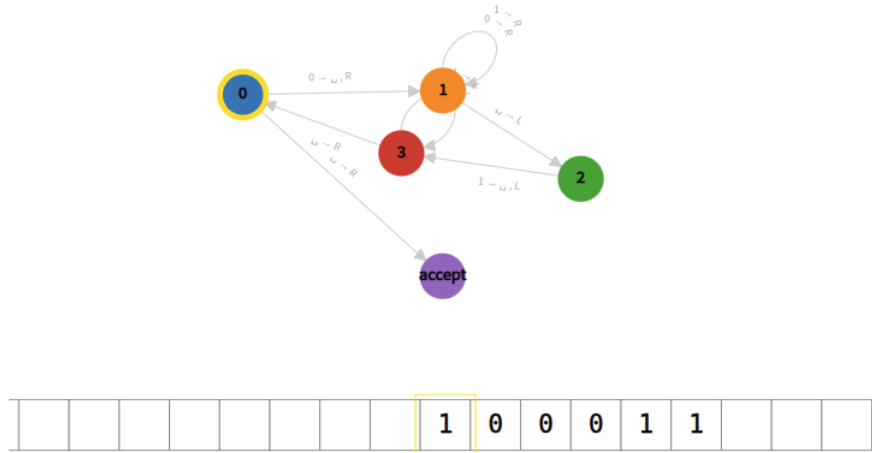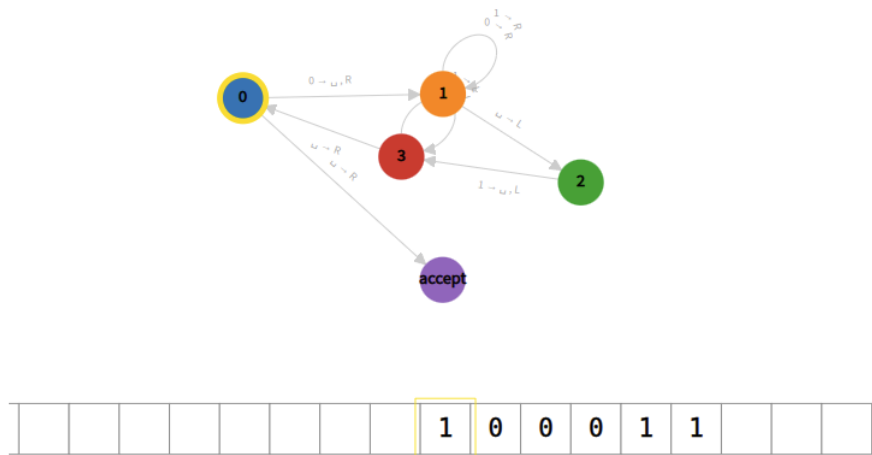
Figure 10: Input = 100011

Figure 11: Input = 100011, Output = Rejected

Question 2

a)

b)

Question 3

a)

b)