# Assignment 7

## Exercise 1

(a)

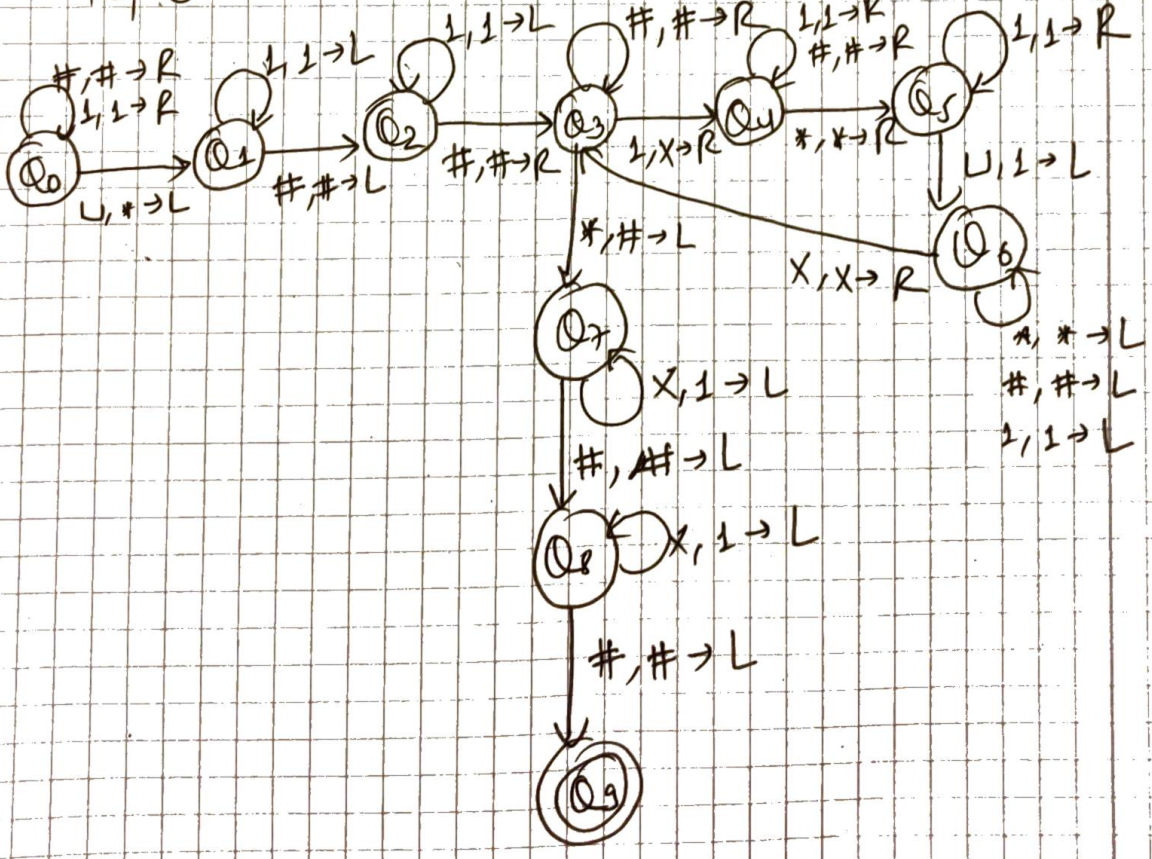
1) Move to the ~~end~~ right of the tape and write "*" when blank symbol is found.

2) Return to the head of the tape.

3) If 1 is found, replace it with "X" and move to the right until blank symbol is found. Replace the blank symbol with 1. If "*" found, then move left replacing all X with 1. Replace "*" with #. Accept after reading # two times.

4) Move left ~~to the~~ until cross is found. Then repeat step 3.

(b)



Exercice 3

(a)

$q_0 000 \sqcup \ldots$
$q_0 \sqcup \sqcup \sqcup \sqcup \ldots$

$0 q_1 00 \sqcup$
$\sqcup q_1 \sqcup \sqcup \sqcup$

$00 q_1 0 \sqcup$
$\sqcup 1 q_1 \sqcup \sqcup$

$0 q_0 0 1 \sqcup$
$\sqcup q_0 1 \sqcup \sqcup$

$0 q_{acc} 0 1 \sqcup$
$0 q_{acc} 0 1 \sqcup$

(b)

$q_0 0 0 1 0 \sqcup \sqcup$
$q_0 \sqcup \sqcup \sqcup \ldots$

$0 q_1 0 1 0 \sqcup \sqcup$
$\sqcup q_1 \sqcup \sqcup \sqcup \sqcup \sqcup$

$q_0 0 1 1 0 \sqcup \sqcup$
$q_0 \sqcup \sqcup \sqcup \sqcup \sqcup \sqcup$

$0 q_1 1 1 0 \sqcup$
$\sqcup q_1 \sqcup \sqcup \sqcup \sqcup$

$0 1 q_0 1 0 \sqcup$
$\sqcup 1 q_0 \sqcup \sqcup \sqcup$

$0 1 1 q_0 0 \sqcup$
$\sqcup q_0 1 \sqcup \sqcup \sqcup$

$0 1 1 q_{acc} 0 \sqcup$
$\sqcup q_{acc} 1 \sqcup \sqcup \sqcup$

Exercise 4.

(a) Line 1 reads the value from the input tape

Line 2 compares it with #, if it's "#", then the program control line will jump to line 9.

Line 3 will store the value of accumulator to *C[3].

The *C[1] will be loaded to accumulator, which will be added with itself. Then the value at C[3] will be again added to the value in C[1].

Line 1 to 7, implements the logic of converting a binary number to decimal and storing the result in register 1.

Line 9 to 15 also converts another binary number to decimal and stores it in register 2.

(b)

17) load 1

18) add 2

19) print a.