Q1 : What does the Turing machine described by the five-tuples $(s_0, 0, s_0, 1, R)$, $(s_0, 1, s_0, 1, R)$, (s_0, B, s_1, B, L), $(s_1, 1, s_2, 1, R)$, do when given

a) 101 as input?

b) an arbitrary bit string as input?

Soln:

(a) done in class.

(b) Every zero on the tape is changed to 1 and input is accepted since state s_0 replaces 0 by 1 moves right and stays in state s_0.

1s are left unchanged and input is accepted.

If the first input is blank then the machine will be in state s_1 with no five-tuple

to apply. Hence it will
halt without accepting.

What does the Turing machine described by the five-tuples $(s_0, 0, s_0, 0, R)$, $(s_0, 1, s_1, 0, R)$, (s_0, B, s_2, B, R), $(s_1, 0, s_1, 0, R)$, $(s_1, 1, s_0, 1, R)$, and (s_1, B, s_2, B, R) do when given

a) 11 as input?

b) an arbitrary bit string as input?

(a) done in class.

(b) Every zero input on the tape remain zero, since the starting state s_0 replace 0 by 0, moves right and stays in state s_0.

The machine changes the first 1 to a zero and changes every alternate 1s to a zero. Otherwise leaves the string unchanged.

If the input is a blank, then the machine will be in the state s_2 with no five-tuple to apply. It accepts.