

## HW-9(Answer)

1. Page-175 Ex-7.4(4(a) and 4(c))

(a) 4

(b)  $2^{16}$

- You can write a program to find out the value or you can create a table to get the value of the function.

2. Page-175 Ex-7.8

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

$\Gamma_1 = \{B, X\} \rightarrow$  input tape alphabet

$\Gamma_2 = \{0, 1, \#\} \rightarrow$  output tape alphabet

Output tape head always moves right. So we don't need to specify that.

$\delta : Q \times \Gamma_1 \rightarrow Q \times \Gamma_1 \times \Gamma_2 \times \{L, R\}$

$Q \setminus \Gamma_1$	B	X
$q_0$	$(q_1, [B, 0], R)$	
$q_1$	$(q_2, [X, 1], L)$	
$q_2$	$(q_3, [B, \#], R)$	$(q_2, [X, 1], L)$
$q_3$		$(q_4, [B, 0], R)$
$q_4$	$(q_1, [X, 0], R)$	$(q_4, [X, 0], R)$

For example:  $\delta(q_4, B) = (q_1, [X, 0], R)$  – means TM is in state  $q_4$  and if it gets a B(blank) symbol in its input tape it will replace it by X, move right and write 0 in the output tape.