

Quiz 3.

① Give a 1-1 correspondence between languages over $\{0,1\}$ and countably infinite sequences over $\{0,1\}$. [8]

② Give the transition functions corr. to the following seq. of configurations.

$(\triangleright, \cdot) (1, 1) (0, \cdot) (\#, \cdot) (1, \cdot) (1, \cdot)$
 $\downarrow (a)$

$(\triangleright, \cdot) (x, \cdot) (0, 3) (\#, \cdot) (1, \cdot) (1, \cdot)$
 $\downarrow (b)$

$(\triangleright, \cdot) (x, \cdot) (0, \cdot) (\#, 3) (1, \cdot) (1, \cdot)$
 $\downarrow (c)$

$(\triangleright, \cdot) (x, \cdot) (0, \cdot) (\#, \cdot) (1, 5) (1, \cdot)$
 $\downarrow (d)$

$(\triangleright, \cdot) (x, \cdot) (0, \cdot) (\#, 6) (x, \cdot) (1, \cdot)$
 $\downarrow (e)$

$(\triangleright, \cdot) (x, \cdot) (0, 7) (\#, \cdot) (x, \cdot) (1, \cdot)$

[5]

continuing from last config. in Q②
↑

③ i) What are the next 5 configurations

if $\delta(7, 0) = (7, 0, L)$

$$\delta(7, 1) = (7, 1, L)$$

$$\delta(7, x) = (1, x, R)$$

$$\delta(1, 0) = (2, x, R)$$

$$\delta(2, 0) = (2, 0, R)$$

$$\delta(2, 1) = (2, 1, R)$$

$$\delta(2, \#) = (4, \#, R)$$

$$\delta(4, x) = (4, x, R)$$

$$\delta(4, 0) = (6, x, L)$$

$$\delta(4, 1) = (8, 1, L) \quad [5]$$

ii) If $\delta \equiv \text{OUTPUT} = 0$, what function do you think the Turing Machine is computing? [2]
