$$\begin{array}{l}
\bar{t}, J, k \geqslant 0 \quad cose: \\
(s, a, \overline{t}_o) \rightarrow (q, a \overline{t}_o) \\
(s, b, \overline{t}_o) \rightarrow (p, b \overline{t}_o) \\
(q, a, a) \rightarrow (q, aa) \\
(q, b, a) \rightarrow (p, e) \\
(p, b, a) \rightarrow (p, e) \\
(p, b, b) \rightarrow (p, bb) \\
(p, a, b) \rightarrow (r, e)
\end{array}$$

$$\begin{array}{l}
\bar{t}, J, k \geqslant 0 \quad cose: \\
(p, e, \overline{t}_o) \rightarrow (f_o, \overline{t}_o) \\
(f_o, b, \overline{t}_o) \rightarrow (p, b \overline{t}_o) \\
(f_o, b, \overline{t}_o) \rightarrow (p, b \overline{t}_o) \\
(r, a, b) \rightarrow (r, e) \\
(r, e, \overline{t}_o) \rightarrow (f_1, \overline{t}_o)
\end{array}$$

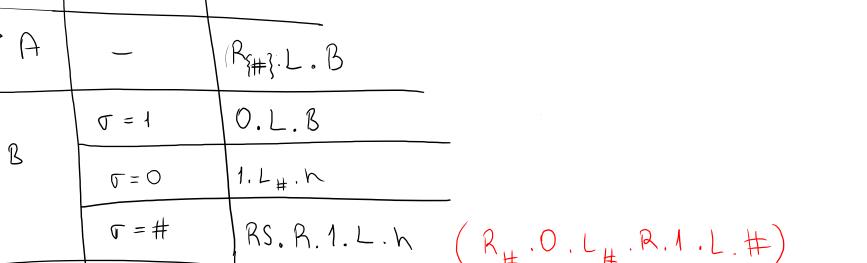
Design and write out in full a Turing machine that scans to the right until it finds two consecutive a's and then halts. The alphabet of the Turing machine should be $\{a, b, \#, \diamondsuit\}$.

$$M = (Q, \Sigma, \delta, s, H)$$

$$state | Symbol | Next | State | oction$$

$$Q_0 | Q_0 | \rightarrow Q_0 | \rightarrow$$

Design a Turing machine that adds 1 to the binary coded integer on its tape and then halts with initial and final IDs are as follows: $(s, \lozenge \# < N >) \mid --* (h, \lozenge \# < N + 1 >)$ where < N > stands for the binary encoding of the integer N. RS: $(s, \diamond \not = \omega) = (h, \diamond \not = \not = \omega)$



Design a TM that decides the language which consists of strings where number of 0s is twice the $\omega \in \{0,1\}^*$ $(s, \Diamond \# \omega)$ $H = \{h_{yes}, h_{no}\}$ number of 1s. Condition | Next TM TM r = # > A R { 0,1, # } . B = () T= # hyes hns 1 x . L # . R { O(1, # } . C X. L . A x. L#. R{0,#3. D h 10

1 hno T= # J = 1 x. L #, A

x, L#. Rfo, #3. E

T= 0 (x. L#. R{1,#}. F