Problem 1 (10 Points) Consider the Turing machine defined by

\[ Q = \{ q_0, q_1 \}, \text{(internal states)} \]
\[ \Sigma = \{ a, b \}, \text{(input alphabet)} \]
\[ \Gamma = \{ a, b, \square \}, \text{(tape alphabet)} \]
\[ F = \{ q_1 \}, \text{(set of final states)} \]

with initial state \( q_0 \), input string on the tape \( aa \), and the transition function \( \delta: Q \times \Gamma \to Q \times \Gamma \times \{ L, R \} \) given by

\[ \delta(q_0, a) = (q_0, b, R) \]
\[ \delta(q_0, b) = (q_0, b, R) \]
\[ \delta(q_0, \square) = (q_1, \square, L) \]

Draw the sequence of events showing the internal state, and the tape symbols at each step.

Problem 2 (10 Points) (a) Use dynamic programming to find the shortest path from node \( A \) to destination node \( H \). Please show the value function clearly. (b) Now, take the value function to be zero for all states, and then show the first iteration of value iteration.

Figure 1: Shortest Path Problem on a Labelled Digraph