Problem 1

The figure below gives a state diagram for Machine $R$. Write down $R$ formally by specifying $(Q, \Sigma, \delta, q_0, F)$. Give as concise a description as possible of the language $G$ that $R$ recognizes. Then formally prove that $R$ recognizes $x$ if and only if $x \in G$.

Problem 2

Consider the set of all strings over the 26-letter lowercase English alphabet. Suppose we wish to design a DFA $J$ that will accept any such finite string, provided it contains the substring “jumbo” somewhere in it. Can you provide the state diagram for $J$? Now we instead want to design the DFA $T$ that will instead accept any string that contains the substring “tufts”. Can you design $T$?