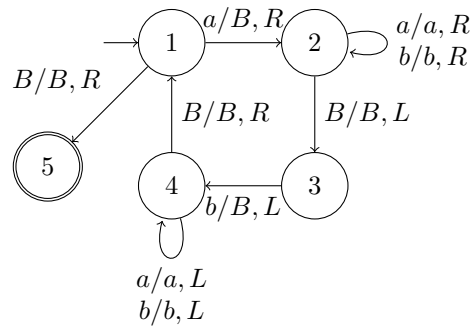


Homework #8

Question 1. For this Turing machine:

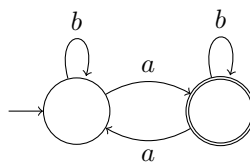


Write sequences of IDs showing that $aabb$ is accepted, and abb is rejected. What is the language of this Turing machine?

Question 2. For each of these languages, make a Turing machine:

- a) $\{bbx \mid x \in \{a, b\}^*\}$
- b) $\{xbb \mid x \in \{a, b\}^*\}$
- c) $\{x \in \{a, b\}^* \mid |x| < 3\}$
- d) $\{x \in \{a, b\}^* \mid \text{the first and last letter of } x \text{ are the same}\}.$
- e) $\{a^n b^k \mid k > n\}$
- f) $\{a^n b a^n\}$
- g) $\{x \in \{a, b\}^* \mid x \text{ uses twice as many } a\text{'s as } b\text{'s}\}$
- h) $\{x \in \{a, b, c\}^* \mid x \text{ uses the same number of } a\text{'s as } b\text{'s (but any number of } c\text{'s)}\}$

Question 3. There is a simple procedure to convert a DFA to a Turing machine. Describe in words how to do this conversion, and demonstrate your method by converting this DFA into a Turing machine:



(Hint: your machine should never modify the tape, and always move to the right.)