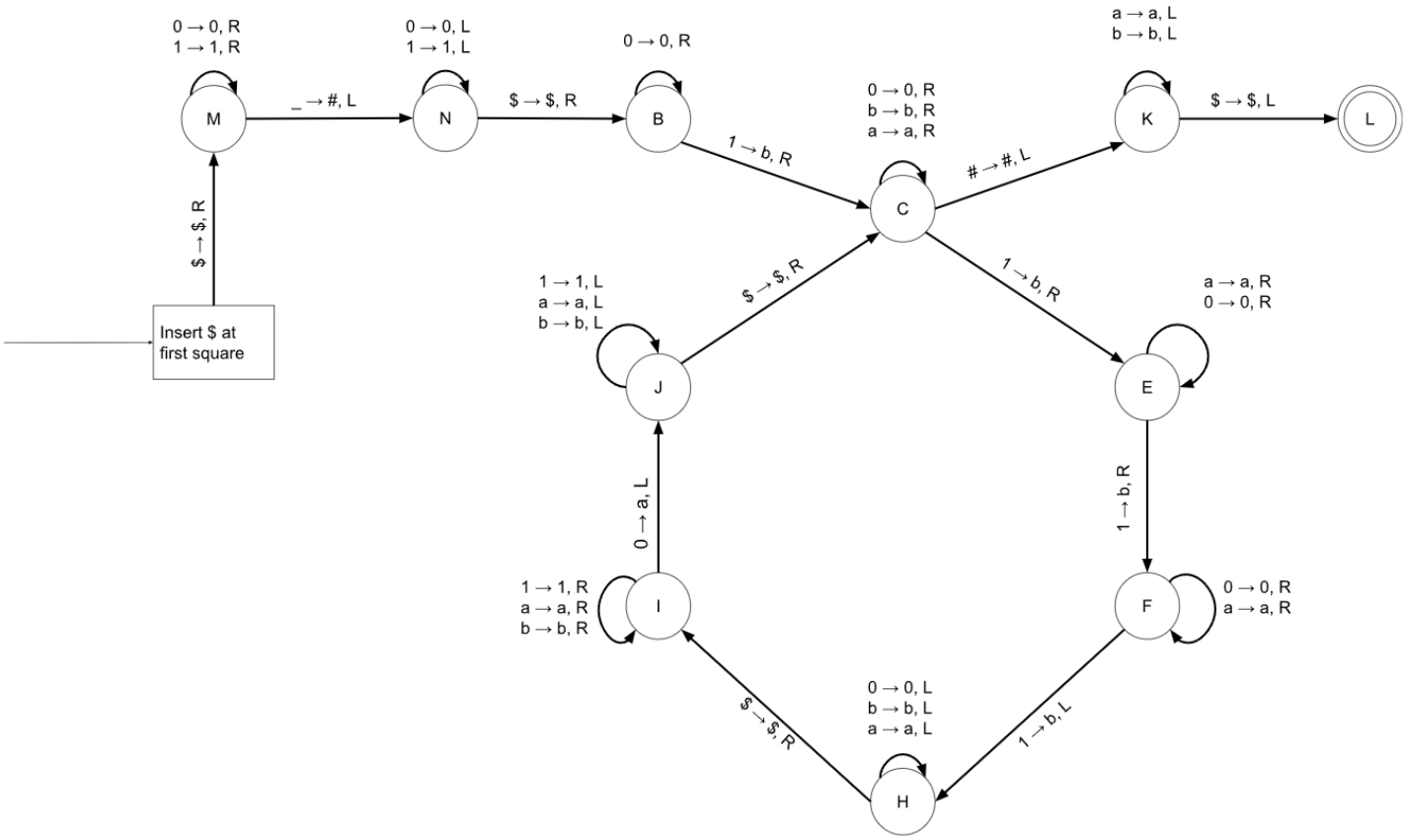
a



We assume the string is weitten on tape and starting from the leftmost square.

Pseudocode:

1. Use lecture 37 TM to inset $ at the leftmost square, and shift all strings to the left.
2. Move right until the first non **0** or non **1** symbol.
3. If the current square symbol is _ or empty symbol replace the empty symbol with **#** else **reject**. [transitioning to state ***N*** from state ***M***]
4. Move left until the first non **1** or non **0** symbol. [state ***N***]
5. If the current square symbol is **$**, then move right. Else **reject**. [transitioning to state ***B***]
6. Move right until the current square is non **0**. [state ***B***]
7. If the current square symbol is **1** then replace **1** with **b** else **reject**. [transitioning to state ***C***]
8. Move right until the current square is non **0** or non **a** or non **b** [state ***C***]
9. If the current square Symbol is **1** replace **1** with **b** and move right,
   Else If current square Symbol is **#** move to step **20**.
   Else **reject**.

10. Move right until the first non **a** or non **0** symbol. [state ***E***]
11. If the current square symbol is **1** then replace **1** with **b** else **reject**. This corresponds to state transition from **E** to **F**
12. Move right until the first non **a** or non **0** symbol.[state ***F***]
13. If the current square symbol is **1** then replace **1** with **b** else **reject**. This corresponds to state transition from **F** to **H**.
14. Move left until the first non **a** or non **b** or non **0** symbol.[state ***H***]
15. If the current symbol is **$** then move right, else **reject**. This corresponds to transition from state ***H*** to ***I***
16. Move right until the first non **a** or non **b** or non **1** symbol.[state ***I***]
17. If the current symbol is **0** then replace **0** with **a** else **reject**. This corresponds to state transition from state ***I*** to ***J***.
18. Move left until the first non **a** or non **b** or non **1** symbol.[state ***J***]
19. If the current symbol is **$** then move to step **8** else **reject**. this corresponds to transtion from state ***J*** to state ***C***.
20. Move left. this corresponds to transtion from state ***C*** to state ***K***.
21. Move left until the first non **a** or non **b** symbol.[state ***K***]
22. If the current symbol is **$** then move left and ***Accept*** else **reject**. This corresponds to transtion from state ***K*** to final accepting state ***L***.