

Morgan Baccus
CptS 317
Homework #11

1.

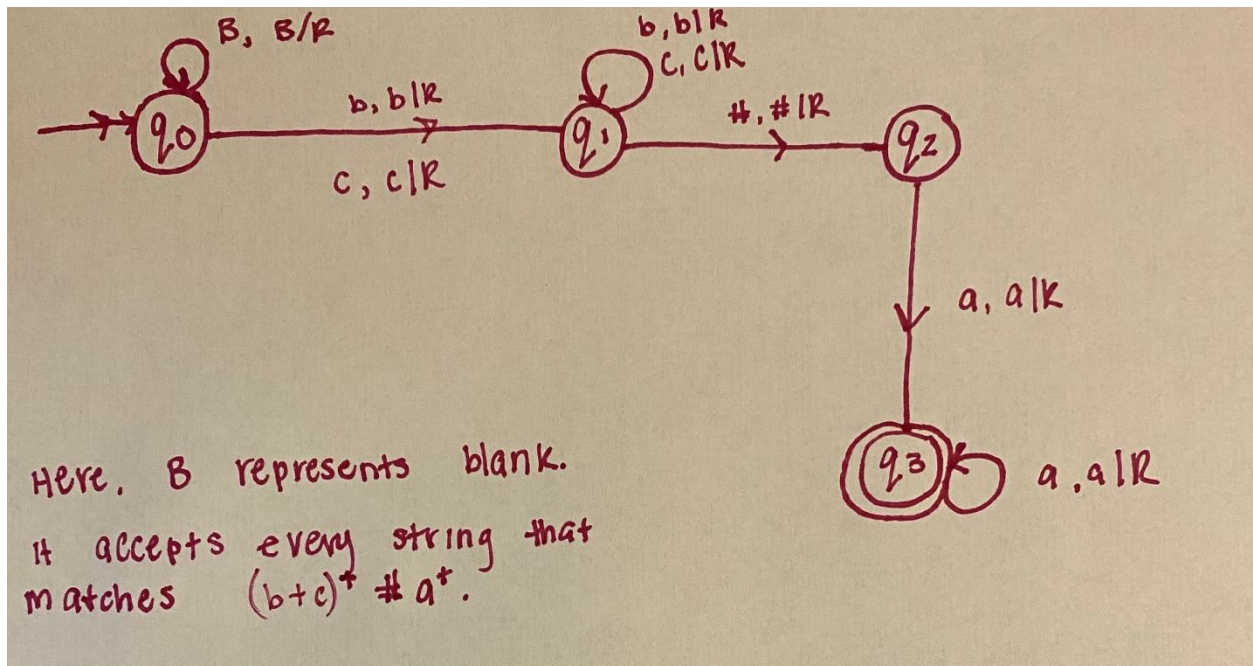
```
#include<stdio.h>
int main() {
    int i=0,ch=0;
    char input[10];

    printf("Enter input"); // Taking the user input

    scanf("%s",input);
    while(input[i]!='\0')
    {
        // Using a switch statement to jump from one state to the other from character to character
        switch(ch)
        {
            case 0: if(input[i]=='B') // First state q0
                ch=0;
            else
                ch=1;
            break;
            case 1: if(input[i]=='#') // Second state q1
                ch=2;
            else
                ch=1;
            break;
            case 2: if(input[i]=='a') // Third state q2
                ch=3;
            break;
            case 3: if(input[i]=='a') // Final state q3
                ch=3;
            break;
        }
        i++;
    }

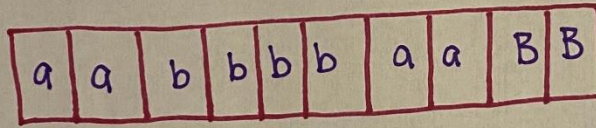
    if(ch==3) // If turing machine halts at final state q3
        printf("string accepted");
    else // If not q3
        printf("string rejected");
}
```

```
return 0;  
}
```



2.

2. TM to recognize $\{x \# x^r : x \in \{a, b\}^+\}$



↑
TM R/W

$$\delta(q_0, a) = (q_1, \overset{a}{\cancel{a}}, R)$$

$$\delta(q_1, a) = (q_1, a, R)$$

$$\delta(q_1, b) = (q_2, b, R)$$

$$\delta(q_2, b) = (q_2, b, R)$$

$$\delta(q_3, a) = (q_1, a, R)$$

$$\delta(q_3, B) = (q_4, B, S) \quad // \quad q_4 \text{ is accepting state}$$

3.

The PDA uses the stack when in the case of recognizing the given string.

Given TM M is a one-turn TM.

The one-turn TM can be defined as the M is only one turn on tape while any executions any input.

That means once the move on tape is right side and after it moves to left side but next do not move right side on the tape because TM M is only one turn.

	1	0	0	1	0	0	0	1	
--	---	---	---	---	---	---	---	---	--

The above TM M contains the value like 10010001.

	1	0	0	1	0	0	0	1	
--	---	---	---	---	---	---	---	---	--

Initially read the values in a tape from right side of tape and its points to tape right side.

It moves to right side on the tape to left side of the tape and its not turn to right side on the tape a second time.

	1	0	0	1	0	0	0	1	
--	---	---	---	---	---	---	---	---	--

From above tape the values read as 1 0 0 1 0 0 0 1 and move to left side and not move to again right.

It is the same as a stack concept as LIFO that means last element of the stack is retrieved first and later access the remaining elements of the stack.

Here above TM M behaves like stack data structure and TM M functionality same as PDA.

If the context free language are recognized by the PDA and described as the language is context free, then if and only if the PDA recognizes the language.

4.

A Turing Machine can be simulated by a two stack PDA by either using a Minsky Machine or a two counter machine. Two two counter machines can be used to represent two stacks which would be equivalent to a four counter machine. This four counter machine can be simulated by two counters through Gödel numbering. This means that a Turing Machine can be simulated by a two stack PDA.