1. **Odd 1 even 0**

#include<iostream>

#include<string>

using namespace std;

int main(){

int i,state=0;

string str;

cout<<"Enter a string :";

cin>>str;

for(i=0;i<str.length();i++){

if(state==0 && str[i]=='0')

state=1;

else if(state==0 && str[i]=='1')

state=2;

else if(state==1 && str[i]=='0')

state=0;

else if(state==1 && str[i]=='1')

state=3;

else if(state==2 && str[i]=='0')

state=3;

else if(state==2 && str[i]=='1')

state=0;

else if(state==3 && str[i]=='0')

state=2;

else if(state==3 && str[i]=='1')

state=1;

else{

cout<<"Invalid string";

return 0;

}

}

if(state==2)

cout<<"String is accepted";

else

cout<<"String is rejected";

return 0;

}

1. **Ending with ba**

#include<iostream>

#include<string>

using namespace std;

int main(){

int i,state=0;

string str;

cout<<"Enter a string :";

cin>>str;

for(i=0;i<str.length();i++){

if(state==0 && str[i]=='a')

state=0;

else if(state==0 && str[i]=='b')

state=1;

else if(state==1 && str[i]=='a')

state=2;

else if(state==1 && str[i]=='b')

state=1;

else if(state==2 && str[i]=='a')

state=0;

else if(state==2 && str[i]=='b')

state=1;

else{

cout<<"Invalid string";

return 0;

}

}

if(state==2)

cout<<"String is accepted";

else

cout<<"String is rejected";

return 0;

}

1. **Donot end with ba**

#include<iostream>

#include<string>

using namespace std;

int main(){

int i,state=0;

string str;

cout<<"Enter a string :";

cin>>str;

for(i=0;i<str.length();i++){

if(state==0 && str[i]=='a')

state=0;

else if(state==0 && str[i]=='b')

state=1;

else if(state==1 && str[i]=='a')

state=2;

else if(state==1 && str[i]=='b')

state=1;

else if(state==2 && str[i]=='a')

state=0;

else if(state==2 && str[i]=='b')

state=1;

else{

cout<<"Invalid string";

return 0;

}

}

if(state==0 || state==1)

cout<<"String is accepted";

else

cout<<"String is rejected";

return 0;

}

1. **NFA ending with 01**

#include <iostream>

#include <vector>

#include<string>

using namespace std;

vector<int> states = {0, 1, 2};

vector<vector<pair<char, int>>> transitions = {

{{'0', 0}, {'1', 0}, {'0', 1}},

{{'1', 2}},

{{}}};

bool simulate\_nfa(string input)

{

vector<int> current\_states = {0};

for (char c : input)

{

vector<int> next\_states;

for (int state : current\_states)

{

for (auto transition : transitions[state])

{

if (transition.first == c)

{

next\_states.push\_back(transition.second);

}

}

}

if (next\_states.empty())

{

return false;

}

current\_states = next\_states;

}

for (int state : current\_states)

{

if (state == 2)

{

return true;

}

}

return false;

}

int main()

{

string input;

cout << "Enter a string to check: ";

cin >> input;

if (simulate\_nfa(input))

{

cout << "String ends with 01." << endl;

}

else

{

cout << "String does not end with 01." << endl;

}

return 0;

}

1. **PDA for anbn**

#include<iostream>

#include<string>

using namespace std;

struct stack{

char A[10];

int top=-1;

}S;

void push(char a){

S.A[++S.top]=a;

}

void pop(){

S.top--;

}

int main(){

string str;

int len,state=0;

cout<<"Enter a string :";

cin>>str;

len=str.length();

for(int i=0;i<len;i++){

if(state==0 && str[i]=='a' &&S.A[S.top]=='a'){

push('a');

state=0;}

else if(state==0 && str[i]=='a' &&S.top==-1){

push('a');

state=0;}

else if(state==0 && str[i]=='b' &&S.A[S.top]=='a'){

pop();

state=1;}

else if(state==1 && str[i]=='b' && S.A[S.top]=='a'){

pop();

state=1;}

else{

cout<<"String rejected";

return 0;

}

}

if(S.top==-1)

cout<<"String accepted";

else

cout<<"String rejected";

}

1. **PDA for equal number of a followed by equal number of b**

#include<iostream>

#include<string>

using namespace std;

struct stack{

char A[10];

int top=-1;

}S;

void push(char a){

S.A[++S.top]=a;

}

void pop(){

S.top--;

}

int main(){

string str;

int len,state=0;

cout<<"Enter a string :";

cin>>str;

len=str.length();

for(int i=0;i<len;i++){

if(state==0 && str[i]=='a' &&S.A[S.top]=='a'){

push('a');

state=0;}

else if(state==0 && str[i]=='a' &&S.top==-1){

push('a');

state=0;}

else if(state==0 && str[i]=='b' &&S.A[S.top]=='a'){

pop();

state=1;}

else if(state==1 && str[i]=='b' && S.A[S.top]=='a'){

pop();

state=1;}

else{

cout<<"String rejected";

return 0;

}

}

if(S.top==-1)

cout<<"String accepted";

else

cout<<"String rejected";

}

1. **TM for equal number of b followed by equal number of a**

#include<iostream>

#include<string>

using namespace std;

int head=0;

void right(){

head++;

}

void left(){

head--;

}

int main(){

string A;

int state=0;

cout<<"Enter a string :";

cin>>A;

while(true){

if(state==0 && A[head]=='b'){

A[head]='X';

right();

state=1;

}

else if(state==0 && A[head]=='Y'){

right();

break;

}

else if(state==1 && (A[head]=='b'||A[head]=='Y')){

right();

}

else if(state==1 && A[head]=='a'){

A[head]='Y';

state=2;

left();

}

else if(state==2 && A[head]=='Y'||A[head]=='b'){

left();

}

else if(state==2 && A[head]=='X'){

state=0;

right();

}

else{

cout<<"String rejected";

return 0;

}

}

for(int i=head;i<A.length();i++){

if(A[i]!='Y'){

cout<<"String rejected";

return 0;

}

}

cout<<"String accepted";

return 0;

}

1. **TM for ancbn**

#include<iostream>

#include<string>

using namespace std;

int head=0;

void right(){

head++;

}

void left(){

head--;

}

int main(){

string A;

int state=0,len;

cout<<"Enter a string :";

cin>>A;

len=A.length();

len--;

while(true){

if(state==0 && A[head]=='a'){

A[head]='X';

right();

state=1;

}

else if(state==0 && A[head]=='c'){

A[head]='X';

state=3;

right();

}

else if(state==1&&(A[head]=='a'||A[head]=='c'||A[head]=='Y')){

right();

}

else if(state==1 && A[head]=='b'){

A[head]='Y';

left();

state=2;

}

else if(state==2 && (A[head]=='a'||A[head]=='c'||A[head]=='Y')){

left();

}

else if(state==2 && A[head]=='X'){

right();

state=0;

}

else if(state==3 && A[head]=='Y'){

right();

break;

}

else{

cout<<"String rejected";

return 0;

}

}

for(int i=head;i<A.length();i++){

if(A[i]!='Y'){

cout<<"String rejected";

return 0;

}

}

cout<<"String accepted";

return 0;

}