

AI
19BCE248
Practical 8

AIM: To implement Min-Max Algorithm

Code:

```
#include <bits/stdc++.h>

using namespace std;

#define ll int64_t
#define int int64_t

#define yami ios_base::sync_with_stdio(0),cin.tie(0),cout.tie(0)

#define pb push_back
#define br break

#define rep(i,n) for(int i=0;i<n;i++)

#define N 200001

const int MAXN =2e5+5;

const int mod=297911111111111111;

int n=3;

vector<vector<int>>>arr(3,vector<int>(3,-1));

vector<vector<vector<int>>>>ans;

int heuristic(int x,int y,int play)
{
    int val=0,cnt=0;

    for(int i=0;i<3;i++)
    {
        if(arr[i][y]==play || arr[i][y]==-1) cnt++;
    }

    if(cnt==3) val++;

    cnt=0;
```

```

for(int i=0;i<3;i++)
{
    if(arr[x][i]==play || arr[x][i]==-1) cnt++;
}
if(cnt==3) val++;
cnt=1;
int i=x-1,j=y-1;
while(i>=0&& j>=0)
{
    if(arr[i][j]==play || arr[i][j]==-1) cnt++;
    i--;
    j--;
}
i=x+1,j=y+1;
while(i<n&& j<n)
{
    if(arr[i][j]==play || arr[i][j]==-1) cnt++;
    i++;
    j++;
}
if(cnt==3) val++;
cnt=1;
i=x-1,j=y+1;
while(i>=0&& j<n)
{
    if(arr[i][j]==play || arr[i][j]==-1) cnt++;
    i--;
    j++;
}
i=x+1,j=y-1;
while(j>=0&& i<n)

```

```

{
    if(arr[i][j]==play || arr[i][j]==-1) cnt++;

    i++;

    y--;
}

if(cnt==3) val++;

return val;
}

```

bool isend()

```

{
    int cnt=0;

    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            if(arr[i][j]==-1) cnt++;
        }
    }

    if(cnt==0) return true;

    return false;
}

```

void func(int play)

```

{
    if(isend()) return;

    if(play==0)
    {
        int x=-1,y=-1,cost=0;

        for(int i=0;i<3;i++)

```



```

        y=j;
    }
}
}
}
arr[x][y]=1;
}
ans.pb(arr);
func(!play);
}
void solve()
{
    arr[0][0]=0;
    arr[1][2]=1;
    ans.pb(arr);
    func(0);
    for(int i=0;i<ans.size();i++)
    {
        cout<<"Pass "<<(i+1)<<"\n";
        for(int j=0;j<3;j++)
        {
            for(int k=0;k<3;k++)
            {
                switch(ans[i][j][k])
                {
                    case 1:
                        cout<<'o';
                        break;
                    case 0:
                        cout<<'x';
                        break;
                }
            }
        }
    }
}

```

```

        default:
            cout<<'_';

        }

        cout<<" ";

    }

    cout<<'\n';

}

cout<<'\n';

}

}

```

```

signed main()
{
    yami;

    int test=1; //cin>>test;

    while(test--)

    {

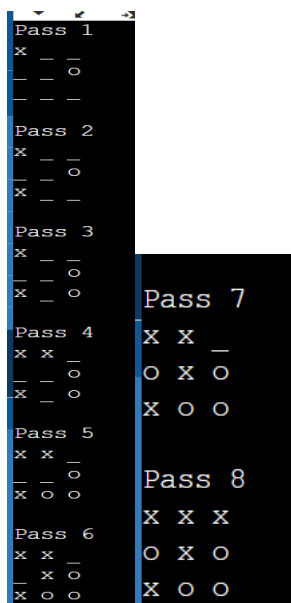
        solve();

    }

}

```

Output:



```

Pass 1
x _ _
_ _ o
_ _ _

Pass 2
x _ _
_ _ o
x _ _

Pass 3
x _ _
_ _ o
x _ o

Pass 4
x x _
_ _ o
x _ o

Pass 5
x x _
_ _ o
x o o

Pass 6
x x _
_ x o
x o o

Pass 7
x x _
o x o
x o o

Pass 8
x x x
o x o
x o o

```