



KIET Group of Institutions, Ghaziabad

Department of Computer Applications

(An ISO – 9001: 2015 Certified & 'A' Grade accredited Institution by NAAC)

Artificial Intelligence Lab

KCA 351: Session 2021-22

Experiment – No-2

Problem Statement : In this problem, three missionaries and three cannibals must cross a river using a boat which can carry at most two people, under the constraint that, for both banks, that the missionaries present on the bank cannot be outnumbered by cannibals. The boat cannot cross the river by itself with no people on board.

Algorithm:

First let us consider that both the missionaries (M) and cannibals(C) are on the same side of the river.

Left Right

Initially the positions are : 0M , 0C and 3M , 3C (B)

Now let's send 2 Cannibals to left of bank : 0M , 2C (B) and 3M , 1C

Send one cannibal from left to right : 0M , 1C and 3M , 2C (B)

Now send the 2 remaining Cannibals to left : 0M , 3C (B) and 3M , 0C

Send 1 cannibal to the right : 0M , 2C and 3M , 1C (B)

Now send 2 missionaries to the left : 2M , 2C (B) and 1M , 1C

Send 1 missionary and 1 cannibal to right : 1M , 1C and 2M , 2C (B)

Send 2 missionaries to left : 3M , 1C (B) and 0M , 2C

Send 1 cannibal to right : 3M , 0C and 0M , 3C (B)

Send 2 cannibals to left : 3M , 2C (B) and 0M , 1C

Send 1 cannibal to right : 3M , 1C and 0M , 2C (B)'

Send 2 cannibals to left : 3M , 3C (B) and 0M , 0C

- Here (B) shows the position of the boat after the action is performed.

Therefore all the missionaries and cannibals have crossed the river safely.



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Program:

M1=3

C1=3

M2=0

C2=0

```
print("Initial state =(3M,3C,Bank->1)")
```

```
print("Goal State = (3M,3C,Bank ->2)")
```

```
while((M2!=3) or (C2!=3)):
```

```
    r = int(input("Enter Your Rules"))
```

```
    if(r == 1):
```

```
        M1-=1
```

```
        M2+=1
```

```
    elif(r == 2):
```

```
        M1-=2
```

```
        M2+=2
```

```
    elif(r==3):
```

```
        M1-=1
```

```
        C1-=1
```

```
        M2+=1
```

```
        C2+=1
```

```
    elif(r==4):
```

```
        C1-=1
```

```
        C2+=1
```



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```
elif(r==5):
```

```
    C1-=2
```

```
    C2+=2
```

```
elif(r==6):
```

```
    M1+=1
```

```
    M2-=1
```

```
elif(r==7):
```

```
    M1+=2
```

```
    M2-=2
```

```
elif(r==8):
```

```
    M1+=1
```

```
    C1+=1
```

```
    M2-=1
```

```
    C2-=1
```

```
elif(r==9):
```

```
    C1+=1
```

```
    C2-=1
```

```
elif(r==10):
```

```
    C1+=2
```

```
    C2-=2
```

```
print(M1,C1)
```

```
print(M2,C2)
```

```
if((M1>0 and M1<C1)or (M2>0 and M2<C2)):
```

```
    print("Tada!!!! The End")
```



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break

Output :

```
Initial state =(3M,3C,Bank->1)
Goal State = (3M,3C,Bank ->2)
Enter Your Rules3
2 2
1 1
Enter Your Rules3
1 1
2 2
Enter Your Rules3
0 0
3 3
```

```
Initial state =(3M,3C,Bank->1)
Goal State = (3M,3C,Bank ->2)
Enter Your Rules1
2 3
1 0
Tada!!!! The End
```