Practical 3

Water jug problem

def water\_jug():

steps=[]

a,b=0,0

steps.append((a,b))

a=5

steps.append((a,b))

transfer= min(5,4-b)

a-=transfer

b+=transfer

steps.append((a,b))

b=0

steps.append((a,b))

transfer= min(a,4-b)

a-=transfer

b+=transfer

steps.append((a,b ))

a=5

steps.append((a,b))

transfer=min(a,4-b)

a-=transfer

b+=transfer

steps.append((a,b))

b=0

steps.append((a,b))

print("Steps too reach (2,0): ")

for idx,state in enumerate(steps):

print(f"step {idx}:jug1={state[0]}L, Jug2={state[1]}L")

water\_jug()

output:

Steps too reach (2,0):

step 0:jug1=0L, Jug2=0L

step 1:jug1=5L, Jug2=0L

step 2:jug1=1L, Jug2=4L

step 3:jug1=1L, Jug2=0L

step 4:jug1=0L, Jug2=1L

step 5:jug1=5L, Jug2=1L

step 6:jug1=2L, Jug2=4L

step 7:jug1=2L, Jug2=0L

2)

import random

distance=[

[0,2,9,10],

[2,0,6,4],

[9,6,0,3],

[10,4,3,0]

]

def get\_cost(tour):

cost=0

for i in range(len(tour)):

cost +=distance[tour[i-1]][tour[i]]

print("Cost of tour ",cost)

return cost

def get\_neighbour(tour):

a,b=random.sample(range(len(tour)),2)

tour[a],tour[b]=tour[b],tour[a]

return tour

def hill\_climb():

current=[0,1,2,3]

random.shuffle(current)

current\_cost=get\_cost(current)

print("Starting tour: ",current,"cost: ",current\_cost)

for i in range(10):

neighbour=current[:]

print("Current neighbour: ",neighbour)

neighbour=get\_neighbour(neighbour)

print("Connected neighbour ",neighbour)

neighbour\_cost=get\_cost(neighbour)

if neighbour\_cost<current\_cost:

current=neighbour

print("Current neighbour ",current)

current\_cost=neighbour\_cost

print("Current cost ",current\_cost)

print("Better tour found: ",current,"Cost: ",current\_cost)

return current,current\_cost

best\_tour,best\_cost=hill\_climb()

print("\n Best tour: ",best\_tour)

print("Best cost ",best\_cost)

output:

Cost of tour 10

Cost of tour 13

Cost of tour 19

Cost of tour 21

Starting tour: [3, 2, 1, 0] cost: 21

Current neighbour: [3, 2, 1, 0]

Connected neighbour [0, 2, 1, 3]

Cost of tour 10

Cost of tour 19

Cost of tour 25

Cost of tour 29

Best tour: [3, 2, 1, 0]

Best cost 21