A.I

LAB TASK 3

Name: Syed Muzzamil Waseem

SID: 11067

CID: 110089

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QUESTION:

Implement Hill Climbing Algorithm that shows traversing down the nodes as per their heuristic value.

CODE:

```
from random import randint
tsp = [
 [923, 529, 297, 693, 907, 542, 693, 401, 280, 785],
 [272, 470, 988, 509, 592, 913, 831, 740, 858, 451]
 ]
def randomSolution(tsp):
    cities = list(range(len(tsp)))
    solution = []
    for i in range (len(tsp)):
        randomCity = cities[randint(0, len(cities) -1 )]
        solution.append(randomCity)
        cities.remove(randomCity)
    return solution
def routeLength(tsp, solution):
    routeLength = 0
    for i in range(len(solution)):
        routeLength += tsp[solution[i-1]][solution[i]]
    return routeLength
def getNeighbours(solution):
    neighbours = []
    for i in range(len(solution)):
        for j in range(i + 1, len(solution)):
            neighbour = solution.copy()
```

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```
            neighbour[i] = solution [j]
            neighbour[j] = solution[i]
            neighbours.append(neighbour)
    return neighbours

def getBestNeighbour(tsp, neighbours):
    bestRouteLength = routeLength(tsp, neighbours[0])
    bestNeighbour = neighbours[0]
    for neighbour in neighbours:
        currentRouteLength = routeLength(tsp, neighbour)
        if currentRouteLength < bestRouteLength:
            bestRouteLength = currentRouteLength
            bestNeighbour = neighbour
    return bestNeighbour, bestRouteLength

def hillClimbing(tsp):
    currentSolution = randomSolution(tsp)
    currentRouteLength = routeLength(tsp, currentSolution)
    neighbours = getNeighbours(currentSolution)
    bestNeighbour, bestNeighbourRouteLength = getBestNeighbour(tsp, neighbours)
    while bestNeighbourRouteLength < currentRouteLength:
        currentSolution = bestNeighbour
        currentRouteLength = bestNeighbourRouteLength
        neighbours = getNeighbours(currentSolution)
        bestNeighbour, bestNeighbourRouteLength = getBestNeighbour(tsp, neighbours)
    return currentSolution, currentRouteLength
def main():
    tsp = [
    [923, 529, 297, 693, 907, 542, 693, 401, 280, 785],
    [272, 470, 988, 509, 592, 913, 831, 740, 858, 451]
    ]
    print(hillClimbing(tsp))
if __name__ == "__main__":
 main()
```

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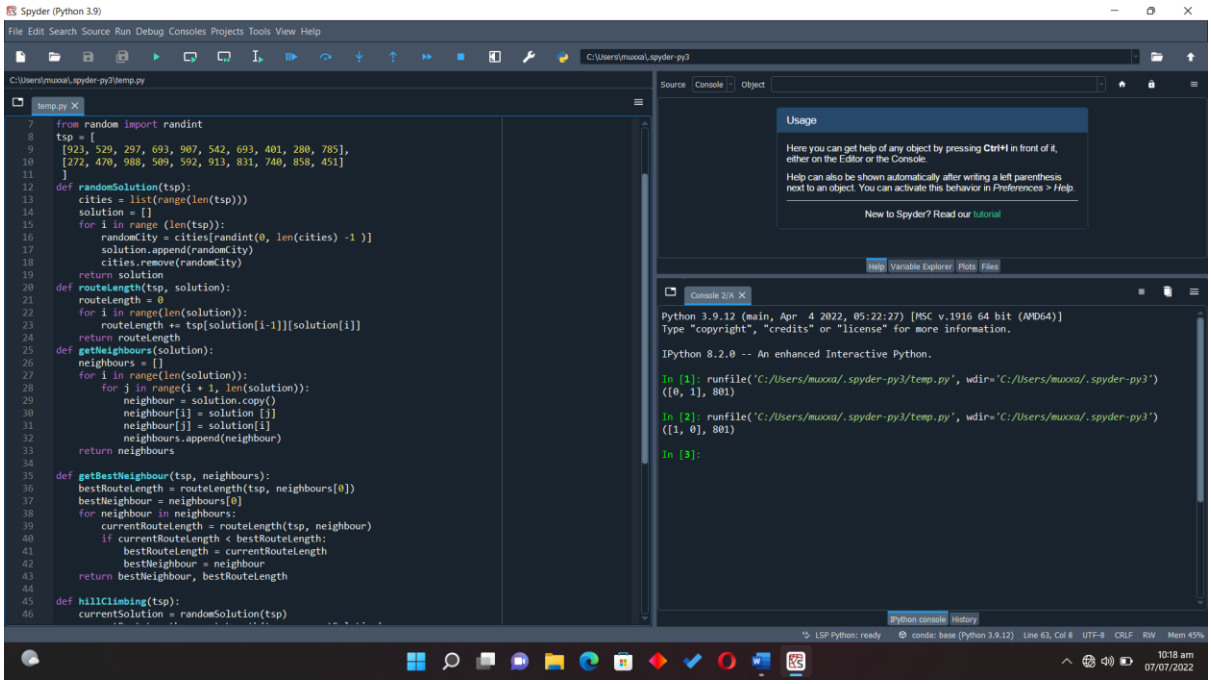
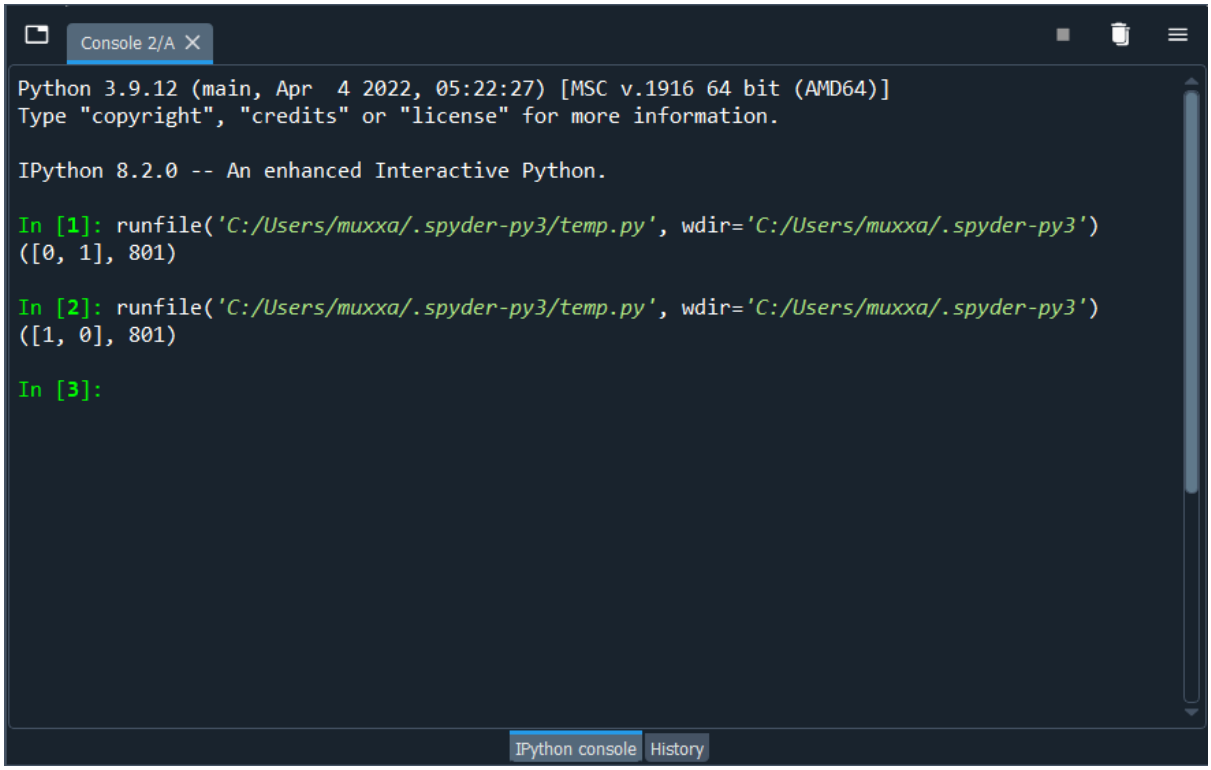
OUTPUT:





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