NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES
FAST - PESHAWAR CAMPUS

Subject: AL 2002 - Artificial Intelligence Lab
Instructor: Muhammad Saood Sarwar

Lab Task: Informed Searches

Question 1: Best-First Search in a Maze

Problem Statement: Implement a Best-First Search algorithm to navigate a maze represented as a 2D grid. The algorithm should find a path from a given start position to a goal position using a heuristic function that estimates the cost to reach the goal.
Requirements:

- The maze is represented as a 2D list where '0' indicates a passable cell and '1' indicates an obstacle.
- The agent can move horizontally or vertically but not diagonally.
- Implement a heuristic function that estimates the cost from the current cell to the goal cell.

Your Implementation:

```
def best_first_search():
    # Your implementation here
    pass

def heuristic():
    # Your heuristic function implementation here
    pass

# Example usage:
# maze = [
#     [0, 1, 0, 0, 0],
```

```
#     [0, 1, 0, 1, 0],
#     [0, 0, 0, 1, 0],
#     [0, 1, 1, 0, 0],
#     [0, 0, 0, 0, 0]
# ]
# start = (0, 0)
# goal = (4, 4)
# path = best_first_search(maze, start, goal)
# print(path)
```

Question 2: A* Search

Problem Statement

You are tasked with developing a program to assist drivers in planning their routes across cities in India efficiently. To achieve this, you have been provided with a CSV file containing the distances between various cities in India.
Your program should read this CSV file and utilize the information to suggest the optimal path for a driver based on their input of the source and destination city.

Instructions

1. Read the provided CSV file containing cities in India and their distances between them.
2. Prompt the user to input their source and destination city.
3. Utilizing the data from the CSV file, determine the optimal path using the A* searching algorithm for the driver to minimize their travel distance.
4. Display the recommended path of cities to the user.

Ensure your program is user-friendly and provides clear instructions to the user.