# Alternative Approach: Nearest Neighbor Heuristic

## Steps:

1. Start from an initial city and mark it as visited.  
2. Iteratively select the nearest unvisited city and add it to the route.  
3. Repeat until all cities are visited.  
4. Return to the starting city to complete the tour.

## Example (Adjacency Matrix):

graph[4][4] = {  
 {0, 10, 15, 20},  
 {10, 0, 35, 25},  
 {15, 35, 0, 30},  
 {20, 25, 30, 0}  
};

## Execution:

- Start at City 0. Route: 0 -> 1 -> 3 -> 2 -> 0  
- Total Cost: 80

## Advantages:

1. Efficiency: O(n^2), faster than brute force (O(n!).  
2. Simplicity: Easy to implement.  
3. Scalability: Suitable for larger datasets.

## Limitations:

1. Suboptimal: Doesn't guarantee the shortest route.  
2. Dependence on starting city: Results vary with the starting point.

## Comparison with Brute Force:

- Brute Force: Always optimal but O(n!), infeasible for n > 10.  
- Nearest Neighbor: Approximate but efficient, O(n^2).

## Conclusion:

Nearest Neighbor Heuristic is ideal for larger datasets and real-world scenarios where speed is crucial.