Algorithm Lab 5: Breadth-First Search (BFS)

Objective: Learn and implement BFS algorithm to solve pathfinding and shortest path problems.

1. **Simple BFS - Graph Traversal:** Given an undirected graph with N vertices, implement BFS to traverse the graph starting from a given source vertex. Print the vertices in the order they are visited.

Example Input
6 7 \\ 6 vertices, 7 edges, starting vertex: 0
0 1
0 2
1 3
1 4
2 4
3 5
4 5
0
Example output : 0 1 2 3 4 5

2. **Maze Solver:** Given a maze represented as a 2D grid where:
   - ➔ 0 represents a walkable path
   - ➔ 1 represents a wall

Find the shortest path from Start to End, if one exists.
Example Input
5 5
0 0 1 0 0
0 0 1 0 1
1 0 0 0 0
0 1 0 1 0
0 0 0 1 0
0 0 \\ Start position
4 4 \\ End position
Expected Output:
Shortest path length: 8
Path: (0,0) → (1,0) → (1,1) → (2,1) → (2,2) → (2,3) → (3,3) → (4,2) → (4,4)

***Home Work:

Knight's Minimum Moves (Night Problem)

Given a chessboard of size N×N, find the minimum number of moves required for a knight to reach from the source position to the destination position.

A knight moves in an "L" shape:

- 2 squares in one direction and 1 square perpendicular, OR
- 1 square in one direction and 2 squares perpendicular

Example Input
8 \\ Board size: 8×8, Start: (0,0), End: (7,7)
0 0
7 7

Expected Output
Minimum moves: 6
Path:
(0,0) → (1,2) → (2,4) → (3,6) → (5,7) → (7,6) → (7,7)