ATMA RAM SANATAN DHARM COLLEGE

Course Title: Discrete Mathematical Structure
                      Practical

Submitted To:

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Course   :   B.Sc. Computer Science Hons.

8. Write a Program to accept a directed graph G and compute the in-degree and out-degree of each vertex.

Code:

```python
# defining the compute_degrees function with two parameters graph and num_vertices.
def compute_degrees(graph, num_vertices):
    # initialising all in and out degrees of each vertex with 0
    in_degrees = [0] * num_vertices
    out_degrees = [0] * num_vertices
# loop for iterating through graph and computing in and out degree.
    for i in range(num_vertices):
        for j in range(num_vertices):
            if graph[i][j] == 1:
                out_degrees[i] += 1
                in_degrees[j] += 1

    return in_degrees, out_degrees

def main():
    graph = []
    num_vertices = int(input("Enter the no. of vertices present in graph: "))
    # taking input for graph in adjacency matrix form
    for i in range(num_vertices):
        rows = []
        for j in range(num_vertices):
            cell = int(input(f"Enter the value of {i,j}: "))
            rows.append(cell)
        graph.append(rows)

    in_degrees, out_degrees = compute_degrees(graph, num_vertices)

    print("Vertex\tIn-Degree\tOut-Degree")
    for i in range(len(graph)):
        print(f"{i}\t{in_degrees[i]}\t\t{out_degrees[i]}")

if __name__ == "__main__":
    main()
```

Output: 1

```
Enter the no. of vertices present in graph: 4

Enter the value of (0, 0): 0
Enter the value of (0, 1): 1
Enter the value of (0, 2): 0
Enter the value of (0, 3): 0
Enter the value of (1, 0): 0
Enter the value of (1, 1): 0
Enter the value of (1, 2): 1
Enter the value of (1, 3): 0
Enter the value of (2, 0): 0
Enter the value of (2, 1): 0
Enter the value of (2, 2): 0
Enter the value of (2, 3): 1
Enter the value of (3, 0): 1
Enter the value of (3, 1): 1
Enter the value of (3, 2): 0
Enter the value of (3, 3): 0

Vertex  In-Degree     Out-Degree
0       1             1
1       2             1
2       1             1
3       1             2
```