

## Assignment 12: Eulerian and Hamiltonian Circuits

1. Determine if the following graph is Eulerian.

**Input: (T, |V<sub>i</sub>|, Adj<sub>i</sub>)**

```
4
5 6
0 1 1 1 0
1 0 1 1 0
1 1 0 0 0
1 1 0 0 1
0 0 0 1 0
4 6
0 1 1 1
1 0 1 1
1 1 0 1
1 1 1 0
4 5
0 1 1 1
1 0 1 0
1 1 0 1
1 0 1 0
5 6
0 1 1 1 1
1 0 1 0 0
1 1 0 0 0
1 0 0 0 1
1 0 0 1 0
```

**Output:**

```
No
No
Yes
Yes
```

2. Find if a given path is Eulerian.

**Input: (T, Adj, P<sub>i</sub>)**

```
3
5 7
0 1 1 1 1
1 0 1 0 0
1 1 0 0 1
1 0 0 0 1
1 0 1 1 0
2 1 0 3 4 2
2 1 0 3 4 0 2
2 1 0 3 4 2 0 4
```

**Output:**

```
No
No
Yes
```

3. Find Eulerian path in a given graph. Print any one path.

**Input: (|V|, |E|, Adj)**

```
5 6
0 1 1 1 1
1 0 1 0 0
1 1 0 0 0
1 0 0 0 1
1 0 0 1 0
```

**Output:**

```
2 -> 0 -> 4 -> 3 -> 0 -> 1 -> 2
```

4. Determine if the following graph is Hamiltonian or not..

**Input: (T, |V<sub>i</sub>|, |E<sub>i</sub>|, Adj<sub>i</sub>)**

```
2
5 7
0 1 0 1 0
1 0 1 1 1
0 1 0 0 1
1 1 0 0 1
0 1 1 1 0
5 6
0 1 0 1 0
1 0 1 1 1
0 1 0 0 1
1 1 0 0 0
0 1 1 0 0
```

**Output:**

Yes

No

5. Find if a given cycle is Hamiltonian or not.

**Input: (T, |V|, |E|, Adj)**

```
2
5 7
0 1 0 1 0
1 0 1 1 1
0 1 0 0 1
1 1 0 0 1
0 1 1 1 0
0 1 2 4 3 0
0 1 2 4 1 3 0
```

**Output:**

Yes

No

6. Find Hamiltonian cycle in a given graph. Print any one cycle.

**Input: (|V|, |E|, Adj)**

```
5 8
0 1 0 0 1
1 0 1 1 1
0 1 0 1 1
0 1 1 0 1
1 1 1 1 0
```

**Output:**

```
0 -> 1 -> 3 -> 2 -> 4 -> 0
```

7. A salesman visits 6 cities to sell electronic items and returns to the first city. He starts from the city 1. Calculate the travelling cost and the order in which the salesman visit each city in order to get maximum profit.

**Input: (|V|, cost\_matrix)**

6

```
0 10 20 5 0 0
10 0 0 25 0 10
20 0 0 35 12 0
5 25 35 0 40 0
0 0 12 40 0 8
0 10 0 0 8 0
```

**Output:**

80: 1 -> 4 -> 3 -> 5 -> 6 -> 2 -> 1