**Problem 1: Detect Cycle in an Undirected Graph**

Given an undirected graph, determine whether the graph contains a cycle or not.

**Input:**

* A graph with N vertices and M edges, where N is the number of vertices and M is the number of edges. The graph is represented as an adjacency list.

**Output:**

* Return true if the graph contains a cycle.
* Return false if the graph does not contain a cycle.

|  |  |
| --- | --- |
| Input | Output |
| 4 4  0 1  1 2  2 3  3 0    Explanation: 0 –> 1 –> 2 –> 3 –> 0 forms a cycle. | true |
| 3 2  0 1  1 2    Explanation: No cycle is formed in the graph. | false |

**Problem 2: Detect Cycle in a Directed Graph**

Given a directed graph, determine whether the graph contains a cycle or not.

**Input:**

* A graph with N vertices and M edges, where N is the number of vertices and MMM is the number of edges. The graph is represented as an adjacency list.

**Output:**

* Return true if the graph contains a cycle.
* Return false if the graph does not contain a cycle.

|  |  |
| --- | --- |
| Input | Output |
| 4 4  0 1  1 2  2 3  2 1    Explanation: 1 -> 2 -> 3 -> 1 forms a cycle. | true |
| 3 2  0 1  1 2    Explanation: No cycle is formed in the graph. | false |