

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

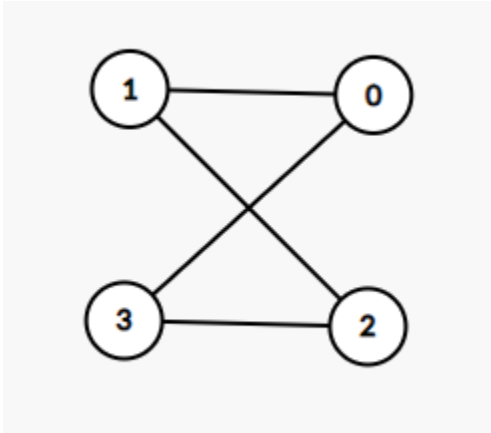
Given an undirected graph, determine whether the graph contains a cycle or not.

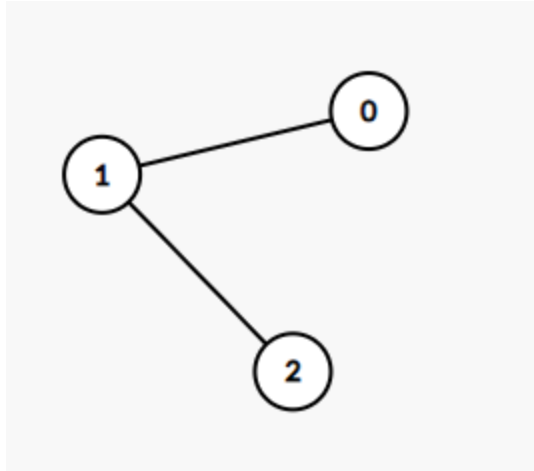
#### Input:

- 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
<p>4 4</p> <p>0 1</p> <p>1 2</p> <p>2 3</p> <p>3 0</p>	true
 <p>Explanation: <math>0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 0</math> forms a cycle.</p>	
<p>3 2</p> <p>0 1</p> <p>1 2</p>	false



Explanation: No cycle is formed in the graph.

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

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

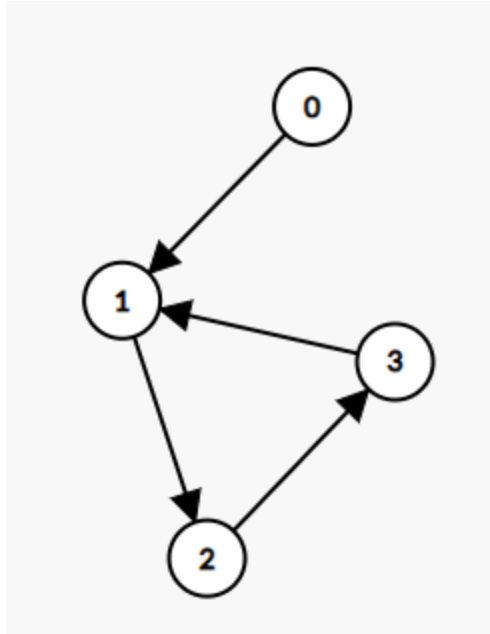
**Input:**

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

**Output:**

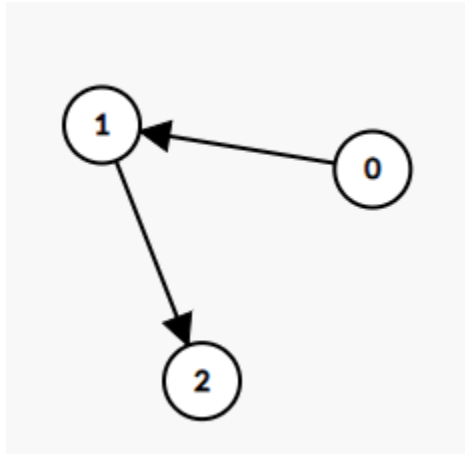
- Return true if the graph contains a cycle.
- Return false if the graph does not contain a cycle.
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Input	Output
4 4 0 1 1 2 2 3 2 1	true



Explanation: 1 -> 2 -> 3 -> 1 forms a cycle.

3 2  
0 1  
1 2



Explanation: No cycle is formed in the graph.

false