Download and Extract

An initial setup of files is provided to you via a shell script: Download potd-q57

Using a terminal, extract the initial files by running the shell script you just downloaded (you will need to navigate to the directory where you saved the file):

```
sh potd-q57.sh
```

Your files for this problem will be in the potd-q57 directory.

The Problem

Your goal is to detect cycles in directed graphs.

Your Job

Your job is to determine whether or not a graph contains a cycle. A cycle in a directed graph is a set of nodes $\{x_1, ..., x_n\}$ in which an edge exists from x_i to x_{i+1} for all $1 \le i < n$ and an edge from x_n to x_1

You will edit the function bool hasCycles(const Graph& g), which returns true/false based on whether or not a graph g contains a cycle.

There are many ways to determine whether or not a directed graph contains a cycle. There are brute force ways and there are more elegant ways, but as long as your implementation works, you will get full points!

Example

Consider the following:

```
Graph g(3);
g.addEdge(0, 1);
g.addEdge(0, 2);
g.addEdge(1, 2);
```

This would create a graph with 3 nodes (0, 1, 2) with edges from 0 to 1, 0 to 2, and 1 to 2.

The output of hasCycles(g) should return false.

On the other hand:

```
Graph g(3);
g.addEdge(0, 1);
g.addEdge(1, 2);
g.addEdge(2, 0);
```

Would create a graph with 3 nodes in which hasCycles(g) returns true

Hint

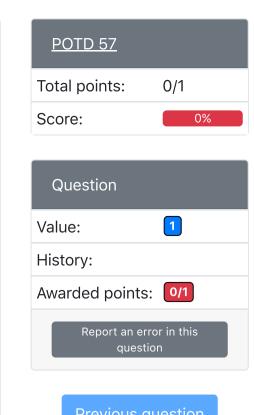
How do you think a search algorithm like BFS/DFS can help detect cycles? Think about a graph that doesn't contain cycles and a graph that does, and then imagine how a generic search algorithm would behave on each. What do you think should happen when a search algorithm is performed on a node in a cycle?

Generic search algorithms are not the only way to detect cycles. If you plan to take CS374 you will learn more about how to detect cycles in directed graphs. Think of this as a warm up to that! Feel free to implement the hasCycles function anyway you want.

Upload Solution

Drop files here or click to upload.

Only the files listed below will be accepted—others will be ignored.



Previous question

Next question

Files		
O cycle_detection.cpp not uploaded		
Save & Grade Save only		