CS 311 Data Structures and Algorithms

Assignment 5

Due on Friday, April 29, 11:59PM.

Graph

Write a C++ program to implement the Depth First Search (DFS), Breadth First Search (BFS), and hasCycle methods of a **directed** graph. Your implementation must meet the following requirements.

1. Use adjacency list to implement a directed graph. The node structure of your adjacency list is as follows:

   ```
   struct edge{
      int adj_vtx; // index of adjacent vertex.
      edge * next; // the link to the next node in the list.
   }
   ```

2. Create and use your own list (for adjacency list) and queue (for BFS) data structures. You cannot use existing APIs (e.g., list) included in the C++ library.

```
class Graph {
        int V; // No. of vertices
        Edge * * adj; // Pointer to an array containing adjacency lists
        void DFSUtil(int v, bool visited[]); // A function used by DFS
public:
        Graph(int V); // Constructor
        void addEdge(int v, int w); // function to add an edge (from v to w) to graph
        void BFS(int s); // BFS traversal of the vertices reachable from s
        void DFS(int v); // DFS traversal of the vertices reachable from v
        bool hasCycle(); // Check whether the graph has a cycle.
};
```

Submit your program to Cougar Course.