

**CS 2123**  
**Data Structures**  
**Assignment 7**  
**Due Friday April 22**

1. (100 pts) Write a program to read a graph from a file and determine whether the graph is a tree or not. A sample graph is given below.

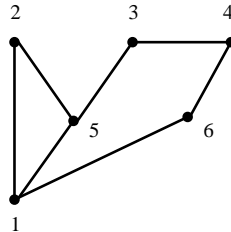


Figure 1: Graph representation

You can visually see that this graph is not a tree. To determine whether a graph is a tree you can use the following theorem.

**Theorem:** *Any connected graph with  $n$  vertices and  $n-1$  edges is a tree.*

Above graph is connected. However, it has 6 vertices and 7 edges. So, it is not a tree.

File format for this assignment is as follows

```
numofvertices numofedges
edge1
edge2
....
```

First line of the file contains the number of vertices and number of edges. Each edge is listed on one line with source vertex and destination vertex. Vertices start at 1. Edges are undirected and will be listed on the file once starting with the smallest vertex id. For example, for edges 2-5 and 5-2 the file will only have 2-5. But, you need to insert both to your adjacency list representation.

File for above graph is as follows

```
6 7
1 2
1 5
1 6
2 5
3 4
3 5
4 6
```

Sample execution of the program for the above graph is as follows

```
fox01> assign7 graph1.txt
The graph does not belong to a tree
```

*Submit your program electronically using the blackboard system*

*The program you submit should be your own work. Cheating will be reported to office of academic integrity. Both the copier and copiee will be held responsible.*