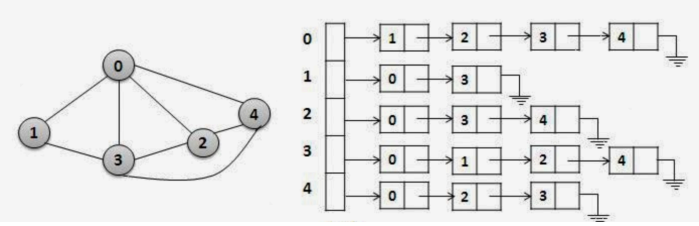
Object Oriented Programming A, B
FAST-NU, Lahore, Spring 2019

Homework 3

The Network Class

Due Wednesday March 27, 11:55 PM 100 points

A Computer Network is stored in the following format: an array, called net, of pointers where each pointer is the head of a list. The list at index i contains the ids of all the computers to which computer i is connected; the order of the ids in a list does not matter.



A class which stores a network is defined below. Implement all the methods stated in the following definition.

```
class Network{
	struct Computer{
		int id;
		Computer * next;
		//method to enable if(n[i][j]) cout<<"i and j are connected.";
		bool operator [] (int j);
	};
	vector<Computer*> net;

	//add id into the list pointed to by head
	void addConnection(Computer*&head, int id);
public:
	//for empty network
	Network();

	//read a network from a file
	Network(string filename);

	//deep copy methods
	Network(const Network& obj);
	const Network& operator =(const Network& obj);

	//create net array of size, with no connections
	Network(int size);

	//connect computers x and y
```

```
      //use the utility method addConnection
      void addConnection(int x, int y);

      //merge two networks (take union)
      //computers, connections in any one of the networks appear in result
      Network operator + (const Network& obj);

      //intersect two networks (extract the common core)
      //links and computers present in both networks appear in the result
      Network operator * (const Network& obj);

      //Remove the common connections of obj and this network
      Network operator - (const Network& obj);

      //Take complement of the Network
      //Returns a network with the same computers
      //but which contains complementary connections
      //resultant contains connections which are absent in this network
       Network operator - ();

      //print the network
      friend ostream & operator << (ostream & out, Network & obj);

    //method to enable if(n[i][j]){cout<<"i and j are connected.";}
      Computer & operator [] (int i);

      //add another computer to the network
      Network operator ++ (int);

      //logical methods
      //subNetwork returns true if obj is a sub-network of this network
      bool subNetwork(const Network& obj);

      //get all neighbors of computer nid
      vector<int> getNeighbors(int nid);

      //get all unique neighbors-of-neighbors of computer nid
      vector<int> getNeighborsOfNeighbors(int nid);

      //returns all computers in order of their number of neighbors
      //computer with most neighbors comes first and so on
      vector<int> orderOfDegree();

      //Suggest connection
      //Returns two unconnected computers with most common neighbors
      vector <int> suggestConnection();

      //de-allocate network
      ~Network();
};
```

THE END