

CS69001: Computing Lab – I
Autumn 2009

Lab Test 1

Date: September 04, 2009

Part 1 **(20)**

You are given a set of n cities (numbered $0, 1, \dots, n - 1$) and all pairs of cities, between which direct flights operate (in both directions). If Cities X and Y have direct flights between them, then the input specifies either X, Y or Y, X , but not both.

Do not generate the flight schedule randomly. The data must be read from a file formatted as follows. The first line in the file stores the number n of cities, and the second line the number e of direct flights. Subsequently, lines $3, 4, \dots, e + 2$ store pairs of cities connected by direct flights. A sample text file is provided below. You may use input redirection to read data from a file formatted as mentioned above.

Part 2 **(20)**

Write a function to find the city with the busiest airport, that is, the city having direct flights to the maximum number of cities.

Part 3 **(20)**

Write a function that, given a pair of cities, determines whether there exists a flight route connecting the given two cities. Notice that multiple flight legs are allowed in a route.

Part 4 **(20)**

Write a function that determines whether any two of the given cities are connected by a flight route.

Part 5 **(20)**

Assume that the function of Part 4 returns *yes*. Write a function that determines whether there exist multiple flight routes among (some) pairs of cities.

(Hint: A connected graph without multiple paths between nodes is a tree.)

Submit a single C/C++ file solving all the above parts. The file must contain your name and roll number.

A sample input file

```
6
7
0 1
0 3
2 4
5 3
4 1
0 5
3 4
```