**Homework lecture 10**

**Graphs**

**Exercise 1: Connected components**

Given an undirected computer network with *n* nodes (numbered from 1 to *n*) and *m* edges, your task is to write a program to calculate the number of connected components.

Input:

* The first line contains two number *n* and *m* separated by spaces
* The next *m* lines, each contains two numbers *x* and *y* (separated by spaces) indicating an edge between *x* and *y*.

Output: The output consists of the number of connected components.

Example:

|  |  |
| --- | --- |
| Input | Output |
| 5 3  1 2  2 3  3 5 | 2 |

**Exercise 2: Shortest path**

Given a directed computer network with *n* nodes (numbered from 1 to *n*) and *m* edges, your task is to write a program to find the shortest path that has the minimum number of edges between two node X and Y.

Input:

* The first line contains four number *n, m,* X, Yseparated by spaces
* The next *m* lines, each contains two numbers *x* and *y* (separated by spaces) indicating an edge from *x* to *y*.

Output: The output consists of the number of edges in the shortest path from X to Y.

Example:

|  |  |
| --- | --- |
| Input | Output |
| 5 5 1 5  1 2  2 3  3 4  4 5  2 5 | 2 |