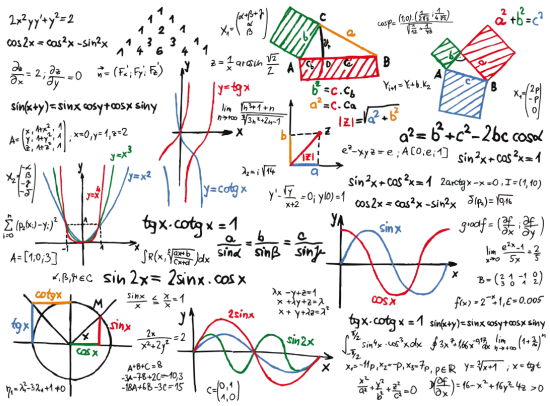
B5 - Mathematics

B-MAT-500

302separation

6 degrees of Facebook separation



302separation

binary name: 302separation
language: everything working on "the dump"
compilation: when necessary, via Makefile, including re, clean and fclean rules

- The totality of your source files, except all useless files (binary, temp files, obj files,...), must be included in your delivery.
- All the bonus files (including a potential specific Makefile) should be in a directory named *bonus*.
- Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

In 1929, a Hungarian named Frigyes Karinthy established the theory of six degrees of separation: every person in the world can be connected to any other person via a chain of individual relationships, that has no more than six links. Nowadays, social networks makes it easy to evaluate the degree of separation between two individuals, and to test this theory.

Starting with a file that contains a list of friendship links between different Facebook accounts, the goal of this project is to use graph theory to compute the degree of separation between two people.

Your program must display the following:

- the list of people in alphabetical order (the order that will be used to build the matrices),
- the adjacency matrix,
- the matrix of the shortest paths, with lengths less than or equal to n.

If two names are given as argument to the program, it must instead display the degree of separation between those two people, or -1 if they are not connected.

Friendships are reciprocal in Facebook: if A is friends with B, B is also friends with A

USAGE

Terminal

```
~/B-MAT-500> ./302separation -h
USAGE
    ./302separation file [n | p1 p2]
DESCRIPTION
    file    file that contains the list of Facebook connections
    n       maximum length of the paths
    pi      name of someone in the file
```

SUGGESTED BONUSES

- Display the link connecting the people
- Graphical visualization of the connections between people

EXAMPLES

Terminal

```
~/B-MAT-500> cat example
Jesus is friends with Chuck Norris
Cindy Crawford is friends with Nicole Kidman
V is friends with Barack Obama
Chuck Norris is friends with Barack Obama
V is friends with François Hollande
Penelope Cruiz is friends with Tom Cruise
Nicole Kidman is friends with Tom Cruise
Katie Holmes is friends with Tom Cruise
Sim is friends with Lara Croft
Sim is friends with Chuck Norris
Lara Croft is friends with V
Yvette Horner is friends with Sim
François Hollande is friends with Barack Obama
Sim is friends with Jesus
Tom Cruise is friends with Barack Obama
```

Terminal

```
~/B-MAT-500> ./302separation example "Yvette Horner" "Barack Obama"
Degree of separation between Yvette Horner and Barack Obama: 3
```

Terminal

```
~/B-MAT-500> ./302separation example "Yvette Horner" "Yvette Horner"
Degree of separation between Yvette Horner and Yvette Horner: 0
```

```
Terminal
~/B-MAT-500> ./302separation example "Yvette Horner" "Mike Tyson"
Degree of separation between Yvette Horner and Mike Tyson: -1
```

Terminal

```
~/B-MAT-500> ./302separation example 3
Barack Obama
Chuck Norris
Cindy Crawford
François Hollande
Jesus
Katie Holmes
Lara Croft
Nicole Kidman
Penelope Cruiz
Sim
Tom Cruise
V
Yvette Horner

0 1 0 1 0 0 0 0 0 0 1 1 0
1 0 0 0 1 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 1 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 1 0
0 1 0 0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 1 0 1 0
0 0 1 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 1 0 0
0 1 0 0 1 0 1 0 0 0 0 0 1
1 0 0 0 0 1 0 1 1 0 0 0 0
1 0 0 1 0 0 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1 0 0 0

0 1 3 1 2 2 2 2 2 2 1 1 3
1 0 0 2 1 3 2 3 3 1 2 2 2
3 0 0 0 0 3 0 1 3 0 2 0 0
1 2 0 0 3 3 2 3 3 3 2 1 0
2 1 0 3 0 0 2 0 0 1 3 3 2
2 3 3 3 0 0 0 2 2 0 1 3 0
2 2 0 2 2 0 0 0 0 1 3 1 2
2 3 1 3 0 2 0 0 2 0 1 3 0
2 3 3 3 0 2 0 2 0 0 1 3 0
2 1 0 3 1 0 1 0 0 0 3 2 1
1 2 2 2 3 1 3 1 1 3 0 2 0
1 2 0 1 3 3 1 3 3 2 2 0 3
3 2 0 0 2 0 2 0 0 1 0 3 0
```