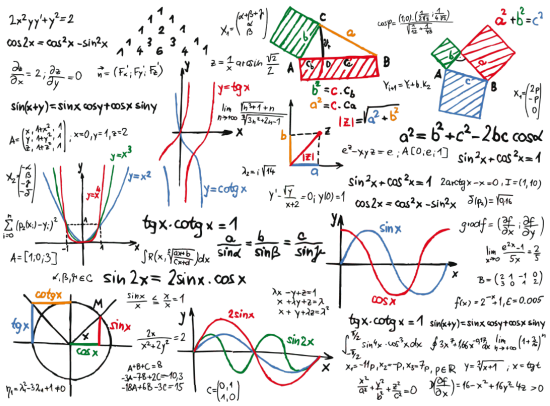

B-1- Mathematics

B-MAT-500

304pacman

Pathfinding and Ectoplasms

v1.0

304pacman

Pathfinding and Ectoplasms

binary name:	304pacman
repository name:	304pacman
repository rights:	ramassage-tek
language:	C, C++, perl 5, python 3 (≥ 3.5), ruby 2 (≥ 2.2), php 5.6, bash 4
group size:	1 to 2
compilation:	via Makefile, including re, clean and fclean rules

- Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).
- 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).

Subject

Pathfinding is an extremely common problem in video game programming. It's why we are asking you to create one for the ghosts in Pacman, with the help of the Dijkstra algorithm.
You will illustrate the algorithm and note its distance from the ghost in each visited square.

If the shortest path isn't the only one, we will execute searches and study the adjacencies in the following order: North, East, South, West.

Prototyping

```
Terminal
~/B-MAT-500> ./304pacman file c1 c2
```

file represents the game board and contains the following characters:

- '0' for an empty square,
- '1' for a wall,
- 'F' for the ghost's position,
- 'P' for Pacman's position.

c1 is the character to display for a wall
c2 is the character to display for an empty space.

Unlike the original game, the maps aren't circular.

Bonus

- a graphic display,
- implement A*,
- a map generator,
- add other types of squares (muddy zones, secret passages etc.),
- dynamically move Pacman or the ghost,
- control Pacman with the keyboard and create a complete game,
- add other ghosts and develop a cooperative algorithm.

Examples

```
Terminal
~/B-MAT-500> cat map1
1111111111
0000000000
0000000000
0000000000
00000F0000
0000000000
00000P0000
0000000000
0000000000
1111111111
```

```
Terminal
~/B-MAT-500> ./304pacman map1 '+' ' '
++++++++++

     2
    212
    1F12
     12
     P


++++++++++
```

There aren't any spaces to add between the characters.

Terminal

```
~/B-MAT-500> cat map2
111111111111111
100000010000001
101011010110101
100P00010000001
101010111010101
101010010000001
101011010110111
111010000010111
100000000010F01
101010000010111
111010111110111
100000110000001
101110110101101
100100010001001
110001110101011
100100010000001
101110110111101
101010000000001
111111111111111
```

Terminal

```
~/B-MAT-500> ./304pacman map2 '@' ' '
@@@@@@@@@@@@@@@
@      @109890@
@ @ @@8@0@@7@9@
@  P767@9876780@
@ @ @5@@@7@5@7@
@ @8@43@7654560@
@ @7@@2@8@@3@@@
@@@6@2109@@2@@@
@76543210101F1@
@8@6@43212@2@@@
@@@7@5@@@@@3@@@
@  876@@7654560@
@ @@@7@@8@6@@7@
@  @ 8 @987@980@
@@   @@@@@8@0@@@
@  @   @1090120@
@ @@@7@@2@@@@3@
@ @ @6543456540@
@@@@@@@@@@@@@@@
```

The integers are displayed in modulo 10 so that the display doesn't go haywire.