



B-1- Mathematics

B-MAT-500

309pollution

Extrapolation and Pollution



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binary name: 309pollution
repository name: 309pollution
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

The ambient air quality monitoring in France is ensured by independent associations, members of the ATMO federation, and, on behalf of the State and public authorities, is responsible for implementing means of monitoring.

Why not you? The Lozère market seems easily open for the taking...

So, you decide to start a project based on collaborative initiatives like CitoyensCapteurs in order to acquire data. All that's left to be done is to create a little software for viewing the data...

You receive the data in triplets (x, y, p) in which x and y are the coordinates (presumably integers so it's simpler) and p for the pollution level (in percentage). We will consider that the pollution is non-existent on the grid's other points.

On the output, you will display the value of the pollution level in points on a normal grid.

Wanting to do things well, you choose to smooth out the data with the help of Bézier's surface area.

Prototyping

```
▼ Terminal - + x
~/B-MAT-500> ./309pollution n f x y
```

with:



n number of points on grid along the axes,
 f csv file composed of the shape's lines $x; y; p$
 x abscissa of the point whose pollution level we want to know
 y order of the point whose pollution level we want to know



Obviously the libraries that manage Bézier's curves and surface areas are unauthorized...

Bonus

- a 3d graphical display,
- a real-time display system.

Examples

```
Terminal
~/B-MAT-500> cat file.csv
0;0;20
0;1;12
1;0;50
1;1;30
1;2;50
2;2;80
~/B-MAT-500> ./309pollution 3 file.csv 0 2
0.00
~/B-MAT-500> ./309pollution 3 file.csv 0.6 2
28.20
~/B-MAT-500> ./309pollution 3 file.csv 1.3 2
56.55
~/B-MAT-500> ./309pollution 3 file.csv 1 1.5
33.94
~/B-MAT-500> ./309pollution 3 file.csv 0.8 0.8
26.11
```