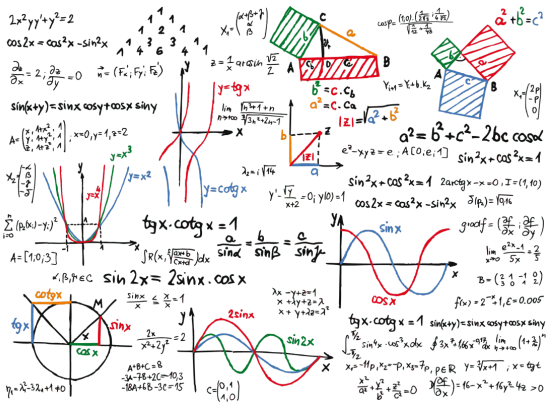
B1 - Mathematics

B-MAT-100

101pong

Vectors and Video Games



101pong

binary name:	101pong
repository name:	101pong_*$ACADEMIC_YEAR*
repository rights:	ramassage-tek
language:	C, C++, python3, perl, ruby, php or bash
compilation:	when necessary, 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).

Pong, developed as an arcade game in 1972 by Ralph Baer (Atari), is the first ever successful video game. It was inspired by the very first video game, *Tennis for Two*, developped in 1958 by William Higinbotham on an oscilloscope.

The goal of this project is to work on a 3D version of this game (or of the *Breakout* game by the way…). Only one bat will be considered, moving only in the 0-altitude plan (which happens to be (Oxy)).

Bounces on the bat and ends of games will not be taken into account ; in other words, **only the ball's movement** will be considered, regardless of the context.

Your program must print:

- The velocity vector of the ball,
- The coordinates of the ball after a given amount of time,
- The angle at which the ball will hit the bat (if it will indeed hit the bat, at anytime from t = 0).

USAGE

Terminal

```
~/B-MAT-100> ./101pong -h
USAGE
    ./101pong x0 y0 z0 x1 y1 z1 n

DESCRIPTION
    x0  ball abscissa at time t - 1
    y0  ball ordinate at time t - 1
    z0  ball altitude at time t - 1
    x1  ball abscissa at time t
    y1  ball ordinate at time t
    z1  ball altitude at time t
    n   time shift (greater than or equal to zero, integer)
```

SUGGESTED BONUSES

- Ball acceleration management,
- A graphical interface,
- A complete 2D *Pong* game,
- A complete 2D *Breakout* game,
- A complete 3D *Pong* game,
- A complete 3D *Breakout* game,
- A spherical bat.

EXAMPLES

Your program output has to be strictly identical to the ones below.

Terminal

```
~/B-MAT-100> ./101pong 1 3 5 7 9 -2 4
The velocity vector of the ball is:
(6.00, 6.00, -7.00)
At time t + 4, ball coordinates will be:
(31.00, 33.00, -30.00)
The ball won't reach the bat.
```

Terminal

```
~/B-MAT-100> ./101pong 1.1 3 5 -7 9 2 4
The velocity vector of the ball is:
(-8.10, 6.00, -3.00)
At time t + 4, ball coordinates will be:
(-39.40, 33.00, -10.00)
The incidence angle is:
16.57 degrees
```

The incidence angle should be between 0 and 90 degrees.

Mind the float numbers precision!