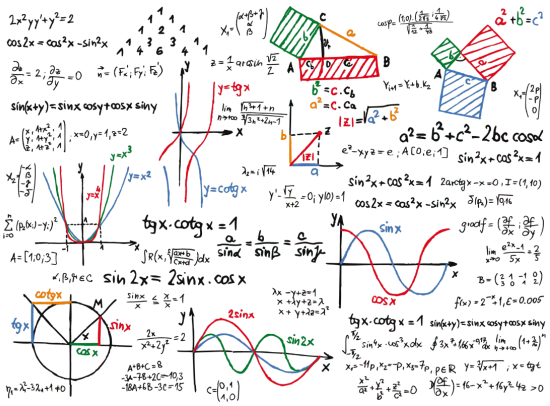
B4 - Mathematics

B-MAT-400

209poll

Confidence Calculation



209poll

binary name:	209poll
repository name:	209poll_*$ACADEMIC_YEAR*
repository rights:	ramassage-tek
language:	everything working on "the dump"
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).

Several months before an important election, many polls seem to pop up from nowhere. Their interpretations are often surrounded by uncertainty: to what extent are these polls reliable? Why are there so many differences between poll institutes? And from day to day? Is a 3% variation significant? etc...

To estimate the accuracy of the results, a *confidence interval* is given. It is defined by the fact that there is a $x\%$ probability that this interval encompasses the true value.

You already know that questioning people follows a Bernoulli process, and therefore that a binomial distribution (converging toward a normal distribution) is a good model for the results. You can then easily compute the confidence intervals, knowing that:

- the 95% confidence interval amplitude is $2 \times 1.96\sqrt{v}$
- the 99% confidence interval amplitude is $2 \times 2.58\sqrt{v}$

where v stands for the variance of the sample proportion (corrected for finite populations).

The goal of this project is to compute the 95% and 99% confidence intervals.

Usage

Terminal

```
~/B-MAT-400> ./209poll -h
USAGE
    ./209poll pSize sSize p

DESCRIPTION
    pSize   size of the population
    sSize   size of the sample (supposed to be representative)
    p       percentage of voting intentions for a specific candidate
```

EXAMPLES

```
Terminal
~/B-MAT-400> ./209poll 10000 500 42.24
Population size:          10000
Sample size:              500
Voting intentions:        42.24%
Variance:                 0.000464
95% confidence interval: [38.02%; 46.46%]
99% confidence interval: [36.68%; 47.80%]
```

```
Terminal
~/B-MAT-400> ./209poll 10000 100 45
Population size:          10000
Sample size:              100
Voting intentions:        45.00%
Variance:                 0.002450
95% confidence interval: [35.30%; 54.70%]
99% confidence interval: [32.23%; 57.77%]
```