Faculté des Sciences de Base
Master in mathematics
Master in computational science and engineering
Scientific computing applied to linear algebra
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Solution of serie 1

The programs are on the moodle page of the week

Exercise 1 *The wrong values (in particular the negative ones) stem from using integer numbers too large for being represented on the computer. Notice that there is no error message when running the program.*

Exercise 2 *In the first formula, we add numbers becoming smaller and smaller to the sum, which results in large rounding errors. These errors are avoided in the second formula, because we start by adding small numbers.*

Exercise 3 *In the first formula, we substract two numbers which are very close; hence the first digits are the same and the difference lay mainly in the last digits, after the seventh one; they are lost because of rounding. The final division by a small number still enhances this effect.*

Exercise 4 *Since, for large* n, $1.0 + 1/n$ *becomes close or equal to* 1 *on the computer, there is no hope of convergence.*

Exercise 5 *We get approximately* 10^{-7} *in single precision and* $10^{-15} - 10^{-16}$ *in double (depending on the machine). Notice that for the gnu compiler these numbers are predefined constants named* `FLT_EPSILON` *and* `DBL_EPSILON` *in* `float.h`.