

MACM 316 – Computing Assignment 1

Due Date: September 19th, at 11pm.

You must upload both your code (to Computing Code 1) and your report (to Computing Report 1) in Crowdmark. The assignment is due at 11:00pm. If you submit, you will be given 0 on the assignment. Your computing report must be exactly 1 page. There will be a penalty given if your report is longer than one page. Your code needs to be printed out from Matlab as a .pdf file in order to upload it to Crowdmark.

- Please read the **Guidelines for Assignments** first.
- Please use the Canvas discussion board and please keep in mind that Canvas discussions are open forums.
- Acknowledge any collaborations and assistance you receive from colleagues/TAs/instructor.

Computing Assignment – Floating Point Arithmetic

Required submission: 1 page PDF document and Matlab scripts uploaded to Canvas.

Let $x \geq 0$ be an arbitrary number and n a nonnegative integer. In exact arithmetic, the following computation leaves x unchanged:

```
1 for i=1:n
2     x=sqrt(x);
3 end
4
5 for i=1:n
6     x=x^2;
7 end
```

However, in finite-precision arithmetic the results may be dramatically different for large n . The purpose of this assignment is to investigate the output of this computation in Matlab for various values of n and for x in the range $0 \leq x \leq 5$.

Your conclusions should be explained in a one-page report. Your report **must** include the following:

- (a) Representative plots of the output as a function of x , with each plot corresponding to a different value of n .
- (b) A discussion of the smallest value of n after which the result of the finite-precision computation begins to differ from exact arithmetic computation.
- (c) A discussion of the limiting behaviour for large n .
- (d) A brief explanation as to why computing in floating point arithmetic leads to the results you have found.

Partial code for this assignment can be found in the file *FloatPt.m* on Canvas. I suggest using this as your starting point. If you have questions about Matlab or other aspects of the assignment or course, then I strongly encourage you to attend the tutorials and drop-in workshops.