MACM 316 – Computing Assignment 1

Due Date: May 26, at 11pm.

You must upload both your code to **Computing Assignment 1-scripts** and your report to **Computing Assignment 1**. The assignment is due at 11:00pm. I have set the due time in Canvas to 11:05pm and if Canvas indicates that you submitted late, 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.

- Please read the **Guidelines for Assignments** first.
- Keep in mind that Canvas discussions are open forums.
- Acknowledge any collaborations and assistance 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:

```
for i=1:n
    x=nthroot(x,2);
end

for i=1:n
    x=x^2;
end
```

x 开2次方 开次

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. 几个有代表性的plots with 它的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. n的最小值 使得 y和x变得不一样了

(c) A discussion of the limiting behaviour for large n. 讨论较大的n 会有什么发生

(d) A brief explanation as to why computing in floating point arithmetic leads to the results you have found. 解释为什么这个算法会有这样的结果

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.