

MTH 351, Winter 2011, Assignment 1

Note: Show your work and all the steps needed to get full credit.

The goal of this assignment is to explore the finite precision and arithmetic and to become familiar with the programming environment.

1. a) Take the last two digits of your OSU ID # and call this number m (example: $m = 28$), and find its binary representation and machine representation in IEEE double format by hand. Confirm your result in MATLAB.

b) What is the decimal representation of the number which in (hex) IEEE double format is 409f6c0000000000 ? Use hand calculation and verify in MATLAB.

2. Explore the limits of the representation of numbers: evaluate m^n . For what n do you get overflow ? Compute $\frac{1}{m^n}$. For what n do you get underflow ?

3. Is there a positive number $\pi/2 > x > \varepsilon$ such that $\cos x = 1$? How many such numbers can you find ?

4. Find numbers x, a, b for which it matters how you evaluate the expressions
i) $x(\sqrt{x+1} - \sqrt{x})$, ii) $a^2 - b^2$, as discussed in class. Show this in MATLAB.