

Homework #1

Math 471

Numbers 1 and 2(b) must be demonstrated in the lab, while 2(a) and 2(c) should be handed in to me.

1. Using the program `sample.m`, find a polynomial and a value of x_1 such that the results of evaluating the polynomial at x_1 with the traditional method differs from that utilizing nested multiplication. Hint: x_1 should not be an integer.
2. *Improving the Quadratic Formula*: For this problem, you may assume that $b^2 - 4ac > 0$

It is known that the analytic solutions to the equation

$$ax^2 + bx + c = 0 \tag{1}$$

are given by the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

In class, we discussed the potential problems associated with the subtraction of two nearly equal numbers and how to resolve this in the case of the quadratic formula when $b > 0$ and $b \approx \sqrt{b^2 - 4ac}$.

- (a) Write up a strategy of how to calculate the roots of a quadratic when $|b| \approx \sqrt{b^2 - 4ac}$ that avoids the subtraction of two nearly equal numbers. Your strategy will depend on the sign of b and includes the case covered in class.
- (b) Write a computer program that prompts the user for the coefficients a , b , and c and finds the solutions of equation 1 utilizing the strategy above.
- (c) Give me a paper copy of the source code for the above program.