

CS 3320
Module 5 – Chapter 5
Roots of Equations – Bracketing Methods

Use only bisection or false position for the first two problems. (You may use the code in the book or slides as the starting point. You need to modify it for the stopping condition.) Use both methods at least once. In each case, obtain maximum accuracy (withing one ulp) for your platform. Explain your work.

1. Find the two real roots of the equation $x^4 - 3x^2 + 75x - 10000 = 0$. Both roots are in the range $[-20, 20]$. (You may want to use incremental search method or graph method to narrow down the intervals for both roots.)
2. Find all roots of the equation $e^x - 3x = 0$. Explain how you set up your procedure to find the solutions. (Graph the function first to find out the where the initial intervals should be.)
3. You plan for buy a Tesla Model S vehicle for \$79,990 by paying 10% down and financing the balance over a 7-year term. You have budgeted a monthly payment of \$1,000. So, now you need to shop for a loan at the required interest rate (or lower). The formula governs the loan calculation is

$$A = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

where A = the monthly payment, P = the loan amount, i = the monthly interest rate in a fraction, not a percentage (you need to divide the APR by 12), and n = the length of the loan in month. Use APR of 3% and 9% as the initial guesses.