

Read: all of Chapter 6**Handwork problems:**

HW3_1: Find a root of $f(x) = 4x^4 - 3x^3 - 30$, using a) Newton Raphson method with initial guess, $x_1 = -2$ and b) using secant method with initial guesses $x_0 = 1.5$ & $x_1 = 2$ and a stopping condition of $e_s = 0.5\%$ (2 sig fig accuracy). Present your work using the following templates, respectively, adding rows as needed). Show the calculations for the first two iterations.

a) Newton Raphson

i	x_i	$f(x_i)$	$f'(x_i)$	x_{i+1}	$ea\ (%)$
1	-2				

b) Secant

i	x_{i-1}	x_i	x_{i+1}	$f(x_{i-1})$	$f(x_i)$	$ea\ (%)$
1	1.5	2				

Coding problems:

HW3_2 According to Archimedes, if a solid that is lighter than a fluid is placed in the fluid, the solid will be immersed to such a depth that the weight of the solid is equal to the weight of the displaced fluid. To find the depth, x , at which the ball floats, this equation must be solved:

$$\rho_c V_c = \rho_w \left(\pi x^2 r - \frac{\pi x^3}{3} \right)$$

Find the floating depth for a cork ball of radius 2 cm whose density (ρ_c) is one-fifth that of water using secant method to an accuracy of 3 sig figs. Write a script and publish to generate pdf and submit on Blackboard. [Use CGS units]

HW3_3 Using built-in functionsa) Use MATLAB built-in function `roots` to find all the roots of the polynomial

$$g(x) = x^4 + 65x^3 + 86x + 128.$$

Print the roots using `fprintf`.***You will find MATLAB functions `real` & `imag` to be helpful for printing complex numbers.*b) Given $f(x) = x^3 - 5x + 10$ and $g(x) = 4 \sin(3x) + 6$

Graph these two functions (using different colors for the lines) such that **all** intersection points are shown. Solve for the intersection points and plot them on the graph with black stars. Use `fzero`.

HW3_4 The displacement, u_y , along the simply supported beam shown below is given as

$$u_y(x) = \begin{cases} -\left(\frac{5}{6}\right)x^4 + \left(\frac{57}{6}\right)x^3 - 238.25x & 0 \leq x \leq 5 \\ -\left(\frac{5}{6}\right)(x^4 - (x-5)^4) + \left(\frac{57}{6}\right)x^3 - 238.25x & 5 < x \leq 7 \\ -\left(\frac{5}{6}\right)(x^4 - (x-5)^4) + 75(x-7)^2 + \left(\frac{57}{6}\right)x^3 - 238.25x & 7 < x \leq 8 \\ -\left(\frac{5}{6}\right)(x^4 - (x-5)^4) + 75(x-7)^2 + \left(\frac{15}{6}\right)(x-8)^3 + \left(\frac{57}{6}\right)x^3 - 238.25x & 8 < x \leq 10 \end{cases}$$

Plot this piecewise function. Use Newton-Raphson method to find the x location of the **maximum displacement** with 3 significant figures of accuracy. Print the answer to the screen using `fprintf`

