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MEEN 357 A2 pdf deliverables

- Strategy for Task 2:

```
"""
Secant Rootfinding pseudocode:

def secant(vals):
    init vars
    validate input

    while (rel_err < tol && num_it < max_it){
        find val at ub and lb

        update relative err
        move bounds
        num_it++

    }
    return root, error, iterations, and exit
"""
```

- Task 4: Work by hand

Task 4: False Position Method by Hand (10 pts)

Consider the function $f(x) = -3x^2 + 5x + 1$ on the interval $-\frac{1}{2} \leq x \leq \frac{1}{2}$. Using the endpoints of the interval as an initial bracket, is there at least one root in the bracket? How can you tell?

By hand, apply the false position method for three iterations using $x_l = -\frac{1}{2}$ (lower bound) and $x_u = \frac{1}{2}$ (upper bound) as an initial bracket. Show your work and explain your results.

a) We know that there is at least one root because f(-0.5) * f(0.5) < 0
   i) $f(-0.5) * f(0.5) = (2.75) * (-2.25) < 0$
b) The false position method for three iterations:
   i) $x: (-0.5, 0.5) \rightarrow (0.05, 0.7425)$ choose right segment
   ii) $x: (0.05, 0.5) \rightarrow (0.1617, 0.7425)$ choose right segment
   iii) $x: (0.1617, 0.5) \rightarrow (0.1779, \sim)$
   iv) $x_3 = 0.1779$

5) task 5

a) I chose to use bisection because the oscillations could lead a secant method to converge outside the target range.

b) I chose to use bisection method because starting at point (0,0) means that the secant method will never intersect the x axis

c) I chose to use the secant method because this function is very clean and has no oscillation or difficult features. This is a good function to take advantage of the secant method's speed.

6) task 6:

False - the newton-raphson method, although known for speed and computational efficiency, is not guaranteed to converge. Between oscillating loops and the chance of finding a root outside the range, the newton-raphson method is not guaranteed to converge at all. Plus, the newton-raphson method requires a derivative, so even if it is continuous, it may not be differentiable and would not allow the method to function.