Due date: _____ **Name:** _____

1. Use Newton's method to estimate the negative root of $e^x = x^2 - 2$ correct to six decimal places. Start with $x_1 = -1.5$.

$e^x - x^2 + 2 = 0$ (f(x))

$f'(x) = e^x - 2x$

$x_2 = -1.5 - \frac{f(-1.5)}{f'(-1.5)} \approx -1.491663433$

$x_3 = x_2 - \frac{f(x_2)}{f'(x_2)} \approx -1.491644195$

$x_4 = x_3 - \frac{f(x_3)}{f'(x_3)} \approx -1.491644195$

-1.491644

2. Use Newton's method to estimate the root of $x^3 = x + 1$ correct to six decimal places. Start with $x_1 = 1.5$.

3. Use Newton's method to estimate the root of $\cos x = x$ correct to six decimal places. Start with $x_1 = 1$. (Note: x is in radians when inputting into $\cos x$.)

$\underbrace{\cos x - x}_{f(x)} = 0$ $\quad f'(x) = -\sin x - 1$

$x_1 = 1$

$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = 1 - \frac{f(1)}{f'(1)} = 1 - \frac{\cos 1 - 1}{-\sin 1 - 1} \approx 0.750363868$

$x_3 = x_2 - \frac{f(x_2)}{f'(x_2)} \approx 0.739112891$

$x_4 = x_3 - \frac{f(x_3)}{f'(x_3)} \approx 0.739085133$

$x_5 = x_4 - \frac{f(x_4)}{f'(x_4)} \approx 0.739085133$

0.739085

Q: What is the center of Gravity? The letter V.

Optional exercises from the Stewart textbook if you'd like more practice:
4.8 (p.348) #7, 15-21 odd