MATH/COSC 303

Assignment 4

Due: Apr 7, in class.

Hand Written Questions:

1. Let
$$f(x) = \frac{e^x}{x^2}.$$
   a) Compute $f'(x)$ and $f''(x)$. Note that both $f'(x)$ and $f''(x)$ are continuous on $[0.5, 3]$.
   b) Show that $f''(x) \neq 0$ for any x.
   c) Prove that f is convex on $[0.5, 3]$. (Hint, compute $f''(0.5)$ and apply IVT.)
2. Use 2 iterations of a Golden Ratio Bracketing Method to minimize $f(x) = \frac{e^x}{x^2}$ starting with the interval $[a, b] = [0.5, 3]$.
3. Use 1 iteration of Quadratic Interpolation to minimize $f(x) = \frac{e^x}{x^2}$ starting with the interval $[a, b] = [0.5, 3]$.
4. Use 3 iterations of Newton's Minimization Method to minimize $f(x) = \frac{e^x}{x^2}$ starting with the point $x_0 = 0.5$.