CSE 330: Spring 2025
Assignment-4
Total Marks: 20

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1. Consider a function f(x) = $x^3 + x^2 - 4x - 4$.
    a. (2 marks) State the exact roots of f(x) and construct two different fixed point functions g(x) such that f(x) = 0.
    b. (3 marks) Compute the convergence rate of each fixed point function g(x) obtained in the previous part, and state which root it is converging to or diverging from.
2. Consider the following function: f(x) = $xe^x - 1$.
    a. (2.5 marks) Find solution of f(x) = 0 up to 5 iterations using Newton's method starting with x0 = 1.5. Keep up to four significant figures.
    b. (2.5 marks) Consider the fixed point function, g(x) = $\frac{2x+1}{\sqrt{x+1}}$. Show that to be super linearly convergent x* has to be $\frac{-3}{2}$. (Here g(x) and x* are arbitrarily taken Just prove that for the value -3/2 g'(x) will 0)
3. In the interval [−4, 4], the function, f(x) = $x^3 - x^2 - 3x + 2$, has three roots at 2.000, 0.6180 and −1.618; and two turning points at x = −0.721 and x = 1.387.
    a. (2.5 marks) Write down the correct intervals, including the root it contains, such that the problem of turning points in Newton Raphson's method can be avoided.
    b. (2.5 marks) Except for the work around from answer (a) can this be solved using the Quasi Newton method?