CSE 330: Summer 2024
Assignment-4
Total Marks: 25

1. Consider a function **f(x) =** $x^3 + x^2 - 8x - 8$

(a) (5 + 3 = 8 marks) State the exact roots of f(x) and construct two different fixed point functions g(x) such that f(x) = 0 and prove that $\mathbf{g_3(x)} = \sqrt{\frac{(x^3+3x^2-8x-8)}{2}}$

(b) (5 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.

2. Consider the following function: $\mathbf{f(x) = x^2 \ln x - e^{-x}}$

(a) (7 marks) Find solution of f(x) = 0 up to 6 iterations using Newton's method starting with $\mathbf{x_0}$ = 0.23 and also show **relative error** in each iteration, keep up to five significant figures.

(b) (5 marks) Consider the fixed point function, $\mathbf{g(x) = \frac{2x+5}{\sqrt{x+3}}}$ **,** Show that to become super-linearly convergent, the root must satisfy **x* = -3.5**