CSE330: Numerical Methods
Assignment 4
Total Marks: 25

1. Consider a function **f(x) =** $x^3 + x^2 - 4x - 4$.

(a) (5 marks) State the exact roots of f(x) and construct two different fixed point functions g(x) such that f(x) = 0.

(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: **f(x) =** $xe^x - 1$.
(a) (5 marks) Find solution of f(x) = 0 up to 5 iterations using Newton's method starting with x_0 = 1.5. Keep up to four significant figures.

(b) (5 marks) For a fixed point function, **g(x) =** $(9x - 1)^{\frac{1}{3}}$, if g(x) leads to divergence, what is the range of x_*?

3. (a) (5 marks) Consider a cubic function, **f(x) = $2x^3 - 2x - 5$.** Compute a **superlinearly convergent fixed point function g(x)** for the given function f(x) using **Newton's method.**