

Note: Answer any five questions. All questions carry equal marks.

1. A root of the equation $xe^x - 1 = 0$ lies in the interval $(0.5, 1)$. Determine this root correct to three decimal places using regular falsi method.
2. Show that rate of convergence of Newton Raphsan Method is 2.
3. (a) Prove that $\ell'_i(x_i) = \frac{\prod''(x_i)}{2\prod'(x_i)}$, where $\ell(x)$ are Lagranges polynomial and $\prod(x) = (x - x_0)(x - x_1)\dots\dots(x - x_n)$.
(b) Using Lagranges interpolating formula find the polynomial satisfying the data,

x	0	1	3
f(x)	1	3	55

4. Derive the Newton-Raphson method for solving the system of two non-linear equations with two unknowns.
5. Calculate the n^{th} divide difference of $\frac{1}{x}$ based on the points $x_0, x_1, x_2, \dots, x_n$.
6. Using Gauss backward interpolation formula and Gauss forward interpolation formula find $f(0.25)$ and $f(0.35)$ respectively from the data,

x	0.1	0.2	0.3	0.4	0.5
f(x)	1.4	1.56	1.76	2	2.28