

**Exercise 1 (6pts)**

Consider the function

$$f(t) = \frac{t - 1}{1 + 2t}$$

Find the Lagrange polynomial to interpolate this function in the interval  $[0, 2]$  using the points 0, 0.5, 1, and 2.

Find the relative error at the points 1.5, and 2.5.

**Exercise 2 (6 pts)**

Consider the following differential equation,

$$\frac{dy}{y} = 2tdt$$

If at  $t = 0, y = 1$  find  $y(1.5)$  (take  $h = 0.5$ ) with :

- 1) Euler method.
- 2) Mid-point.
- 3) RK4 method.
- 4) Give the analytical solution, what is the relative error in calculation  $y(0.5)$ .

**Exercise 3 (8 pts)**

Solve the following system equations by Gauss method and Cholesky method.

$$\begin{cases} 2x_1 + 3x_3 + 4x_4 = 2 \\ x_2 + x_4 = 1 \\ 3x_1 + 2x_3 + x_4 = 2 \\ 4x_1 + x_2 + x_3 + x_4 = -1 \end{cases}$$