Name: **Lab# 07** **Your ID #:**

Interpolation/Numerical integration

Please answer the below questions:

Q1 (5pts): Find a polynomial interpolation of degree 3 such that P(-1)=P(0)=1, P(1)=3 and P(2)=1 where

$P(x) = a_0 x^3 + a_1 x^2 + a_2 x + a_3$

Graph the data and the function on the same graph.

Hite: generate set of liner question and solve them to get the values of a_0, a_1,a_2, and a_3

Q2 (5pts): Perform a polynomial interpolation of degree 3 on the following data points:

x = [-2, 0, 1, 2] y = [-5, 1, 2, -1]

a) Generate the Divided Difference Table
b) Use (a) to produce the polynomial interpolation function.
c) Graph the data and the function on the same graph.

Q3 (5pts): Perform a Lagrange interpolation on the following data points:

x = [-2, 0, 1, 2] y = [-5, 1, 2, -1]

a) Find the value of the function at x = 0.5.
b) Graph the data, value of the function at x = 0.5, and the function on the same graph.

Q4 (5pts): Evaluate the integral $\int_1^2 \frac{1}{1+x}\,dx$

Using one interval and Multiple Application. Compare the error of each method for one interval and how many integral is required to reduce the relative error to 0.01%

a) Exact solution
b) Trapezoid method
c) Simpson's 1/3-Rule
d) Simpson's 3/8-Rule
e) Monte Carlo