Assignment 2
30 Marks
Deadline: Jul 15, 2025 (Tuesday)

1. Consider the following table of data points/nodal points:

Time (sec) t	Velocity (m/s) v(t)
10	24
15	31
18	43

   (a) [3+2 marks] Find an interpolating polynomial of velocity that goes through the above data points by using **Vandermonde Matrix** method. Also compute an approximate value of acceleration at Time, **t = 17 sec.**
   (b) [5 marks] Find an interpolating polynomial of velocity that goes through the above data points by using **Lagrange** method.

2. Read the following and answer accordingly:

   (a) [4 marks] Consider the nodes **[−π/4, 0, π/4]**. Find an interpolating polynomial of appropriate degree by using **Newton's Divided-Difference** method for
   $f(x) = -x^2\cos(x)$.
   (b) [2 marks] Use the interpolating polynomial to find an approximate value at **π/3**, and compute the percentage relative error at **π/3**.
   (c) [4 marks] Add a new node **π** to the above nodes, and find the interpolating polynomial of appropriate degree.

3. [10 Marks] The function **$f(x) = e^{3x} - e^{-3x}$** has been interpolated at the nodes at **(-2, 0, 2)** using Lagrange method. Evaluate the upper bound of the interpolation error for the interval **[-5, 1]** using Cauchy's theorem. Keep up to 8 significant figures.