Instructions for preparing the solution script:

- Write your name, ID#, and Section number clearly in the very front page.
- Write all answers sequentially.
- Start answering a question (not the part of the question) from the top of a new page.
- Write legibly and in orderly fashion maintaining all mathematical norms and rules. Prepare a single solution file.
- Start working right away. There is no late submission form. If you miss the deadline, you need to use the make-up assignment to cover up the marks.

A. Consider the following function, $v(t) = -\frac{3}{4}t^2 + \frac{19}{2}t - 6$ and $t_0 = 2, t_1 = 4, t_2 = 6$. Based on these, answer the following questions:

1. (4+1 marks) Find an interpolating polynomial for velocity that passes through the given data points using the Vandermonde Matrix method. Additionally, determine an approximate acceleration value at t=7 seconds.
2. (4 marks) Determine an interpolating polynomial for velocity that passes through the given data points using the Lagrange method.
3. (1 mark) If an additional data point is added in the given scenario, which method should be utilized to determine the new interpolating polynomial? Additionally, what will be the degree of the new polynomial?

B. Read the following questions and answer accordingly:

1. (4 marks) Given the nodes $[-\frac{\pi}{2}, 0, \frac{\pi}{2}]$, determine an interpolating polynomial of the appropriate degree using Newton's divided difference method for the function $f(x) = xsin(x)$.
2. (2 marks) Utilize the interpolating polynomial to estimate the value at $\frac{\pi}{4}$, and determine the percentage relative error at $\frac{\pi}{4}$.
3. (4 marks) Insert a new node π into the given set of nodes and determine the interpolating polynomial of the appropriate degree.