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 pat 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.

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1. Read the following and answer accordingly:

   (a) (5 marks) Find an interpolating polynomial of appropriate degree using the Newton's divided-difference method for $f(x) = \sin(x)$. Consider the nodes $[0,\pi/2,\pi]$.

   (b) (1 mark) Use the polynomial to find an approximate value of $f(3\pi/2)$.

   (c) (3 marks) Add a new node to the above nodes, and find the interpolating polynomial.

   (d) (2 marks) Write down the interpolation error term for the above polynomial, and identify the polynomial.

   (e) (4 marks) Estimate the upper bound of the interpolation error between the given function $f(x) = \sin(x)$, and the interpolating polynomial with four nodes.

2. Consider the following data points given below and answer the question based on these data:

x	$f(x)$	$f'(x)$
-1	0	1
1	1	0

   (a) (4 marks) Find the Lagrange basis from the given data.

   (b) (4 marks) Using the values in the previous part, compute the Hermite basis and simplify your expression as much as possible.

   (c) (2 marks) Finally find the expression of the interpolating Hermite polynomial.