

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.

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1. (3+3 marks) Compute the Chebyshev points and then the Chebyshev nodes for $n = 5$ for the interval $[-2, 3]$.
 2. (6+6+2 marks) Consider the function $f(x) = \sin x - \cos x$ and the nodes $[0, \pi/2]$. Compute: (i) the Lagrange bases and their derivatives, (ii) the Hermite bases and then (iii) find the Hermite interpolation polynomial.
 3. A function is given by $f(x) = x \ln(3x) + x^2$. Now answer the following up to five significant figures.
 - (a) (4 marks) Approximate the derivative of $f(x)$ at $x_0 = 2$ with step size $h = 0.1$ using the central difference method.
 - (b) (6 marks) Calculate the upper bound of the truncation error of $f(x)$ at $x_0 = 2$ using $h = 0.1$ using the central difference method.