Instructions for preparing the solution script:

- Write your name, ID#, and Section number clearly in the very front page.
- Please use A4 paper and 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. Consider the function $f(x) = \sin(x) + \cos(x)$ at the nodes $\{-\pi, -\pi/2, 0\}$. Answer the following:
   (a) (6 marks) Write down the Vandermonde matrix V, and find the interpolation polynomial using V.
   (b) (6 marks) Evaluate the Lagrange bases for the given nodes, and find the Lagrange interpolation polynomial.
   (c) (8 marks) Compute the Newton basis elements needed to find the interpolation polynomial, and compute the Newton interpolation polynomial.
   (d) (5 marks) Using Cauchy's theorem, compute the upper bound of the interpolation error.
   (e) (5 marks) Now add a new node $\pi/2$ to the above nodes, and find the interpolating polynomial using the appropriate method.