Assignment # 4	CSE 330	Due Date
(All Sections)	Spring 2022	25/04/2022 (6:00pm)

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 and rename it "ID#_FirstName_TheorySection#.pdf".
- 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. A linear systje is defined by the following equatiosn,

$$\begin{aligned} -x_1 + x_2 - x_3 &= -1\ , \\ 2x_1 + 6x_2 - x_3 &= 3,\ , \\ 6x_1 + 5x_2 + 3x_3 &= 8\ . \end{aligned}$$

   From this linear system answer the following:

   (a) (3 marks) Does the system have unique solution or infinite solution? Explain or show calculation with reasoning.

   (b) (2 marks) Find the augmented matrix for the linear system.

   (c) (5 marks) Solve the system using Gaussian elimination method.

2. Suppose you have the following data points for a polynomial of degree 2

x	0	-1	1	3
y	3	7	-2	-4

   Find the best fit polynomial, $P_2(x)$ for the above data points by the least squares method by answering the following:

   (a) (4 marks) Write down the matrices: A, b and A^T; and then compute the normal matrix A^TA and A^Tb.

   (b) (6 marks) Now let $V = A^TA$. Apply LU-decomposition method on the matrix V to find the value of column matrix elements of $x = (a_0,\, a_1,\, a_2)^T$.
