Drexel University
ENGR 231 – Linear Engineering Systems
Lab 5: In Class Assignment Fall 2016-17

Note: You must create a ".m file" called: **lastname_initials_lab5.m**. The mfile MUST contain cells and you must publish it to a PDF. When it is correct you need to upload to bblearn. All figures must be annotated, all cells named.

Consider the following system of linear equation:

$$2x_1 + x_2 + 4x_3 + 9x_4 + 6x_5 = 13$$
$$7x_1 + x_2 + 5x_4 - x_5 = 5$$
$$32x_1 + x_3 + 3x_5 = 68$$
$$-2x_1 + x_3 + 22x_4 - 2x_5 = 17$$
$$-51x_1 - 3x_4 + 4x_5 = -6$$

Perform the following tasks (label cells as task numbers). Note the first cell (unnumbered) should be your Name, section number and the version of this Assignment. Tasks follow:

(1) Form the matrix A and b. Using Matlab, compute the determinant of matrix A, i.e; det(A). Is matrix A invertible? Give reason for your answer. Show that det (A^{-1}) = $1/\det(A)$. **(2 pts)**

(2) Form a matrix B by adding 1 to all the matrix A coefficients and show that det(AB) = det(A)det(B) **(1 pt)**

(3) Now, using matrix A, show that the relation $AA^{-1} = A^{-1}A = I$ is true. **(1 pt)**

(4) Form an identity matrix I_n of equivalent size with A. Concatenate A with I_n and use rref to show that $[A \mid I]$ could be transformed into $[I \mid A^{-1}]$. Use Matlab help to check how to use the *eye* command **(2 pts)**

(5) Now use the Gauss-Jordan elimination method to solve the system of equation A x = b. (1 pt)

(6) Use Cramer's rule separately to obtain the same solution as in cell 5 above. Recall that Cramer's rule is given as:

$$xi = \det(A \text{ with } ith \text{ column replaced by } b) \,/\, \det(A) \qquad \textbf{(3 pts)}$$