ENGR 231 – Linear Engineering Systems

Lab 4: In Class Assignment Spring 2017

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

Consider the following system of linear equations:

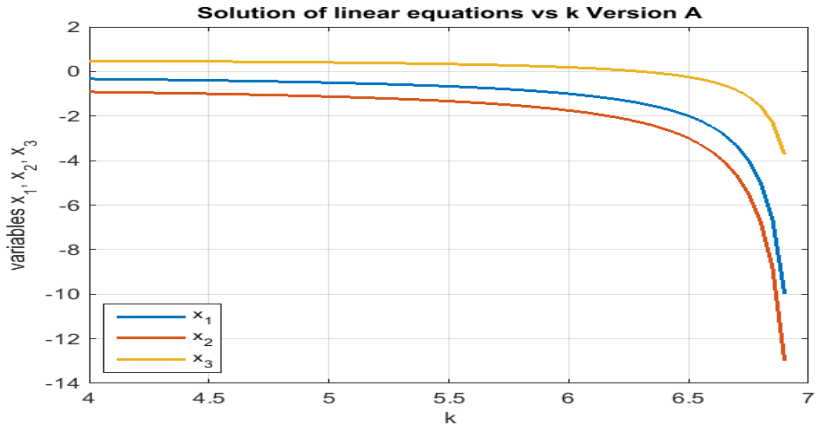
$$\begin{aligned} \boldsymbol{k}x_1 - 16x_3 &= -9 \\ -3x_1 + x_2 + 4x_3 &= 2 \\ 2x_1 - 3x_2 + 4x_3 &= 4 \end{aligned}$$

which could represent the constant voltages in a circuit, or the static forces in a bridge. The coefficient "**k**" is a parameter of the system under consideration that can vary.

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. Let ***k* = 7** and enter the system into MATLAB as an augmented matrix. What kind of solution does this system have (if it has one)? Justify your answer as comments in cell.

2. Let ***k* = 4:0.05:6.90** and create a for loop that finds and saves the solution of the system for each value of **k**. ***DO THIS BY INDEXING*** Here are a few hints to help:
   a. Use the ***numel*** function to find out how many elements are in ***k***.
   b. Use the **zeros** function to create a place to store your solutions call it **results**. Each solution of the system is a 3x1 column vector, so the matrix called **results** must be 3xN, where N is the number of elements in ***k***
   c. Let ***w*** be the indexing variable used in the for loop.
      i. For each pass through the loop run, extract the w^{th} value from ***k***, and substitute it into the system augmented matrix (location M(1,1),
      ii. find the solution using RREF (remember last column is solution)
      iii. extract the 3x1 solution vector and store it in the w^{th} column of your solution matrix (**results**).
3. Plot all three components of the system solution versus ***k***. Discuss what the graph look like as ***k*** approaches ***7***? Does this make sense? Correct plot is given below.



Note: Submit a published pdf file of your script with convention **lastname_initials_section#_lab#.m** The published document must include all functions used. All figures must be annotated (labels, legends, markers, title, etc. Answers to questions asked should be printed as an output.