Daniel B. Szyld 24 January 2023

Linear Algebra, Math 2101-002
Problem Set #2
Due Tuesday 31 January 2023, 9:30 am.

Write your name on your response sheet. Explain your answers in as much detail as possible. Check your examples and results. You need to explain every step of your logic, development and calculation. No credit will be given without the intermediate steps or the explanations. Please read all questions before you start your answers.

Let

$$A = \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 5 & 7 & 7 \\ 3 & 6 & 6 & 6 \end{bmatrix}.$$

(a) Find all possible solutions of the homogeneous system $Ax = 0$.
(b) Find all possible solutions of $Ax = b$, where

$$b = \begin{bmatrix} 3 \\ 7 \\ 9 \end{bmatrix}.$$

(c) Write explicitly four different particular solutions for $Ax = b$.
(d) What is the rank of A? Which ones are the basic columns? (write them explicitly). How many free variables there are? Write the formula for the number of free variables, and confirm that it holds in this case.