Math 251 X02 Assignment 3

Covers: Sections 3.4-3.6
Due: Thurs Nov 6 at 11:30am

INSTRUCTIONS:
This assignment will be marked for completion.
Solutions will be posted on the course website 24 hours after the deadline.
You may not copy the work of another person or AI.
Submit jpg or pdf files to the D2L Dropbox.

1. Solve $\begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 0 \\ 7 & 9 & 1 \end{bmatrix} \begin{bmatrix} 2 & -3 & 4 \\ 0 & 5 & 6 \\ 0 & 0 & 8 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 58 \\ -156 \\ 632 \end{bmatrix}$.

2. Find a basis for span($\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix}$) by considering the row space of a certain matrix.

3. Find a basis for span($\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix}$) by considering the column space of a certain matrix.

4. Find a basis for the null space of $A = \begin{bmatrix} 1 & 2 & 3 \\ -2 & -4 & -6 \\ 3 & 6 & 9 \end{bmatrix}$.

5. Let S be the transformation that reflects a vector in $\mathbb{R}^2$ in the line $y = -x$. Let R be the transformation that rotates a vector in $\mathbb{R}^2$ by 60° clockwise. Find the standard matrix for the transformation that first performs S and then R. Simplify your answer to a single matrix.