Fall 2024 MATH33A Worksheet 4 Answers

If you notice any mistakes, please let us know!

1. Note that answers may vary.

   (a) Kernel: $\emptyset$. Image: $\begin{bmatrix} 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 7 \\ -6 \end{bmatrix}$.

   (b) Kernel: $\begin{bmatrix} -4 \\ 1 \\ 1 \end{bmatrix}$. Image: $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}$

   (c) Kernel: $\begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix}$. Image: $\begin{bmatrix} 1 \\ 2 \\ 3 \\ -2 \end{bmatrix}, \begin{bmatrix} 0 \\ 5 \\ 1 \\ 0 \end{bmatrix}$

2. (a) No (not closed under addition)

   (b) No (does not contain zero)

   (c) Yes (prove that it contains zero and is closed under addition and scalar multiplication)

3. (a) Linearly independent

   (b) Linearly dependent

   (c) Linearly independent

4. $k \neq -2, 0, 2$

5. $\begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -4 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 4 \\ 0 \\ 0 \\ 1 \end{bmatrix}$