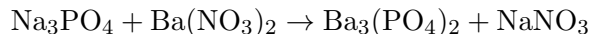


Directions: You may work to solve these problems in groups, but all written work must be your own. Show all work; no credit for solutions without work..

1. [1.6.6] Balance the following chemical reaction.



2. [1.7.{1,3,4}] Determine if the vectors are linearly independent. Justify your answer.

(a) $\begin{bmatrix} 5 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 7 \\ 2 \\ -6 \end{bmatrix}, \begin{bmatrix} -2 \\ -1 \\ 6 \end{bmatrix}$

(b) $\begin{bmatrix} 1 \\ -3 \end{bmatrix}, \begin{bmatrix} -3 \\ 6 \end{bmatrix}$

(c) $\begin{bmatrix} -1 \\ 4 \end{bmatrix}, \begin{bmatrix} -2 \\ 8 \end{bmatrix}$

3. [1.7.{9,10}] For which values of h is $\mathbf{v}_3$ in $\text{Span}\{\mathbf{v}_1, \mathbf{v}_2\}$? For which values of h is $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ linearly dependent?

(a) $\mathbf{v}_1 = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}, \mathbf{v}_2 = \begin{bmatrix} -3 \\ 10 \\ -6 \end{bmatrix}, \mathbf{v}_3 = \begin{bmatrix} 2 \\ -7 \\ h \end{bmatrix}$

(b) $\mathbf{v}_1 = \begin{bmatrix} 1 \\ -5 \\ 3 \end{bmatrix}, \mathbf{v}_2 = \begin{bmatrix} -2 \\ 10 \\ 6 \end{bmatrix}, \mathbf{v}_3 = \begin{bmatrix} 2 \\ -10 \\ h \end{bmatrix}$

4. True/False. Justify your answers.

- (a) Two vectors are linearly dependent if and only if they lie on a line through the origin.
 - (b) If S is a linearly dependent set, then each vector in S is a linear combination of the other vectors in S .
 - (c) If a set contains fewer vectors than there are entries in the vectors, then the set is linearly independent.
 - (d) If $\mathbf{x}$ and $\mathbf{y}$ are linearly independent but $\{\mathbf{x}, \mathbf{y}, \mathbf{z}\}$ is linearly dependent, then $\mathbf{z} \in \text{Span}\{\mathbf{x}, \mathbf{y}\}$.
5. Let $\mathbf{u}_1, \dots, \mathbf{u}_n$ be vectors, and suppose that $\mathbf{v}$ is a vector that can be obtained as a linear combination of $\mathbf{u}_1, \dots, \mathbf{u}_n$ in two different ways. Prove that $\mathbf{u}_1, \dots, \mathbf{u}_n$ are linearly dependent.