Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-02-20, 23:59 IST

For some questions in this assignment, you will need to recall the definition of a linear subspace. A subset $V \subseteq \mathbb{R}^n$ is called a subspace if $\alpha x + \beta y \in V$, for all $x, y \in V$ and $\alpha, \beta \in \mathbb{R}$.

1) Consider the following matrix.

$$A = \begin{bmatrix}
1 & 2 & 3 & 4 \\
5 & 6 & 7 & 8 \\
9 & 10 & 11 & 12 \\
13 & 14 & 15 & 16
\end{bmatrix}.$$ 

Then the nullity of $A$ is equal to

1
2
3
4

No, the answer is incorrect.
Score: 0
Accepted Answers:
2

2) Consider the following matrix

$$V = \begin{bmatrix}
1 & 1 & 1 & 1 \\
1 & -1 & 2 & -2 \\
1 & 1 & 4 & 4 \\
1 & -1 & 8 & -8
\end{bmatrix}.$$
L(S), where \( S = \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 8 \end{bmatrix} \right\} \).

L(S), where \( S = \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ -2 \\ -2 \\ -2 \\ -2 \end{bmatrix}, \begin{bmatrix} 4 \\ 4 \\ 4 \\ 4 \\ -8 \\ -8 \\ -8 \\ -8 \end{bmatrix} \right\} \).

L(S), where \( S = \left\{ \begin{bmatrix} 1 \\ -1 \\ 1 \\ -1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -2 \\ 4 \\ -8 \end{bmatrix} \right\} \).

\( \mathbb{R}^4 \).

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( \mathbb{R}^4 \).

3) Let \( V \) and \( W \) be two subspaces of \( \mathbb{R}^5 \) such that \( \dim V = 3 \) and \( \dim W = 2 \). Define

\( V + W = \{ v + w : v \in V, w \in W \} \).

(Check that \( V + W \) is a subspace.) Assuming that \( V + W \) is a subspace, which of the following conditions will imply that \( V + W = \mathbb{R}^5 \)?

1) \( \dim (V+W) > \max(\dim V, \dim W) \).
2) The intersection of \( V \) and \( W \) is the set \( \{0\} \), where \( 0 \) is the zero vector.
3) \( \dim V + \dim W > 4 \).
4) The intersection of \( V \) and \( W \) is nonempty.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The intersection of \( V \) and \( W \) is the set \( \{0\} \), where \( 0 \) is the zero vector.

4) Consider the vector space \( \mathbb{R}^3 \). Let \( Z = \{0\} \), where \( 0 \) is the zero vector. Which of the following statements is correct?

1) \( Z \) is NOT a linear subspace.
2) \( Z \) is a linear subspace with dimension 1.
3) \( Z \) is a linear subspace with \( Z \) itself as a basis.
4) \( Z \) is a linear subspace with the empty set as a basis.

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( Z \) is a linear subspace with the empty set as a basis.