Tutorial letter 101/0/2024

Linear Algebra II

MAT2611

Year Module

Department of Mathematical Sciences

TUTORIAL RESOURCE FOR MAT2611

IMPORTANT INFORMATION:
This tutorial letter contains Assignment 3 for the module MAT2611

BAR CODE

Learn without limits.

UNISA | university of south africa

Problem 9. Determine whether the sets U are V are subspace of $\mathbf{R}^4$ defined by

$$
\begin{aligned}
U &= \{(x,y,z,0) \in \mathbf{R}^4 : x + y = z\} \text{ and} \\
V &= \{(x,y,z,v) \in \mathbf{R}^4 : x = 2z \text{ and } y = v + 1\}.
\end{aligned}
$$

[10 marks]

Problem 10. Express the following as a linear combinations of $\mathbf{u} = (2,1,4)$, $\mathbf{v} = (1,-1,3)$, and $\mathbf{w} = (3,2,5)$.

(a) $(6,1,6)$ (b) $(0,0,0)$ (c) $(7,8,9)$

[10 marks]

Problem 11. Which of the following sets of vectors in $\mathbf{R}^4$ are linearly independent.

(a) $(1,2,-2,1)$, $(3,6,-6,3)$, $(4,-2,4,1)$

(b) $(2,1,1,-4)$, $(2,-8,9,-2)$, $(0,3,-1,5)$, $(0,-1,2,4)$

(c) $(1,1,0,0)$, $(0,1,0,1)$, $(0,0,1,1)$, $(1,0,1,0)$, $(1,0,0,1)$

[10 marks]

Problem 12. Determine whether the solution space of the system $A\mathbf{x} = \mathbf{0}$ is a line through the origin, a plane through the origin, or the origin only for

$$
A = \begin{bmatrix} 1 & 2 & -6 \\ 1 & 4 & 4 \\ 3 & 10 & 6 \end{bmatrix}
$$

[10 marks]

[Total: 40 marks]

– End of assignment –