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 10 for the module MAT2611

BAR CODE

ASSIGNMENT 10
Due date: Friday, 23 August 2024

Problem 37. Let $T : \mathbf{R}^3 \to \mathbf{R}^3$ be multiplication by A. Determine whether T has an inverse. If so, find $T^{-1}\left(\begin{bmatrix} x \\ y \\ z \end{bmatrix}\right)$, where $A = \begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 2 \\ -1 & 2 & 1 \end{bmatrix}$.

[10 marks]

Problem 38. Let $T : P_1 \to \mathbf{R}^2$ be the defined as $T(p(x)) = (p(0), p(1))$.
(1) Find $T(1 - x)$.
(2) Show that T is a linear transformation.
(3) Show that T is one-to-one.

[10 marks]

Problem 39. Suppose $T : R^3 \to R^3$ is a linear operator defined by

$$T(x, y, z) = (2x - y, 2y - z, 2z - x).$$

Find the matrix for T with respect to the basis $B = \{v_1, v_2, v_3\}$, where $v_1 = (1, -1, 0)$, $v_2 = (-1, 0, -1)$, $v_3 = (0, 1, -1)$.

[10 marks]

Problem 40. Find $(T_3 \circ T_2 \circ T_1)(x, y)$, where
$T_1(x, y) = (x, -y, x - y)$,
$T_2(x, y, z) = (3x, 0, x - y + z)$,
$T_3(x, y, z) = (x + y - z, x + 2y)$.

[10 marks]

[Total: 40 marks]

– End of assignment –