

SCHOOL OF APPLIED SCIENCE & HUMANITIES

DEPARTMENT OF MATHEMATICS

Subject: Linear Algebra

Subject Code : 25MT103

Sem. : I

Academic Year: 2025-2026

Section: 21

Regulation: R25

**T5 - Assignment 6**

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1. Define the following.
  - a. Real Inner Product Space
  - b. Norm of a vector
  - c. Cauchy-Schwarz inequality
2. Show that the function  $\langle f, g \rangle = \int_{-2}^2 (1 + x^2) f(x) g(x) dx$  defines an inner product on  $C[-2, 2]$ .
3. In  $\mathbb{R}^2$  with inner product  $\langle x, y \rangle = x^T C y$ , where  $C = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$ , compute  $\|x\|_C$ ,  $(1, 3)^T$ .
4. In  $\mathbb{R}^3$  with inner product  $\langle x, y \rangle = x^T B y$ , where  $B = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ , compute  $\|x\|_B$ ,  $(2, -1, 4)^T$ .