St. Xavier's College (Autonomous), Kolkata

Department of Statistics

Assignment 2

MDTS 4113/SEM I/CORE3

Module 1

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1. On R^n define two operations $\underline{\alpha} + \underline{\beta} = \underline{\alpha} - \underline{\beta}$

   c.$\underline{\alpha} = -c\underline{\alpha}$

   The operations on the right are the usual ones. Which of the axioms for a vector space are satisfied by $(R^n, +, .)$?

2. a) What is the dimension of the whole n by n matrix space?

   b) What is the dimension of the subspace of diagonal matrices?

3. Let V be the (real) vector space of all functions f from R into R. Which of the following sets of functions are subspaces of V?

(a) all f such that f(x^2) = f$(x)^2$;
(b) all f such that f(0) = f(1) ;
(c) all f such that f(3) = 1+f(-5);
(d) all f such that f(- l) = 0;
(e) all f which are continuous.

4. Describe the column spaces (lines or planes) of these particular matrices:

A=$\begin{pmatrix} 1 & 7 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$, B = $\begin{pmatrix} 1 & 0 \\ 0 & 3 \\ 0 & 0 \end{pmatrix}$, C = $\begin{pmatrix} 1 & 0 \\ 2 & 0 \\ 0 & 0 \end{pmatrix}$

5. Is the vector (3, - 1, 0, - 1) in the subspace of R^5 spanned by the vectors (2, -1, 3, 2), (- 1, 1, 1, -3), and (1, 1, 9, -5) ?