

DEPARTMENT OF MATHEMATICS
BARASAT GOVERNMENT COLLEGE
SELF ASSESSMENT TEST-1 [SAT-1]

SEMESTER-IV (HONS.)- 2020

Subject: Mathematics

Course Code: MTMACOR10T

DATE OF SAT-1: 17/04/2020

Maximum Marks: 25

Time: 1 Hr.

[Answer all questions]

1. Define sub-space of a vector space. Examine if the set $S = \{(x, y, z) \in R^3 : x + 2y - z = 1, 2x - y + z = 2\}$ is a subspace of R^3 or not. [2+ 3]
2. Define linear span of a set. Prove that $L(S)$ is the smallest subspace of vector space V containing the set S . [1+4]
3. Show that a linearly independent set of vectors of a finite dimensional vector space V over a field F is either a basis of V or can be extended to a basis of V . Extend the set $(1, 1, -1), (2, 1, 1)$ to a basis of R^3 . [3+2]
4. Prove that a set of vectors containing the null vector in a vector space $V(F)$ is linearly dependent. [2]
5. Let $W = \{(x, y, z) \in R^3 : x - 4y + 3z = 0\}$. Show that W is a subspace of R^3 . Find the dimension of W . [3]
6. If V be the real vector space of all real matrices of the form $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and W be the subset of those matrices of V for which $a + b = 0$, then prove that W is a subspace of V and find a basis of W . [5]

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