

Question Bank for PG Course

অঙ্ক (Mathematics)

প্রথম(খ) পত্র (Paper - IB)

Linear Algebra : PGM-T-IB

- Which of the followings is/are vector space over the real field?
 1. Set of all real polynomials $R[x]$
 2. Set of real polynomials of degree 2
 3. Set of real polynomials of degree less than 2
- Which of the followings is a subspace of the vector space R^2 over the real field?
 1. $\{(x, 0): x \in R\}$
 2. $\{(x, 2x): x \in R\}$
 3. $\{(x, x^2): x \in R\}$
- Let $W_1 = \{(x, 0): x \in R\}$ and $W_2 = \{(0, y): y \in R\}$. Is $W_1 \cup W_2$ a subspace of R^2 ?
- Is the vector $(1, 2, 3)$ linearly independent or dependent in the vector space R^3 over the real field?
- Are the vectors $(1, 2, 3)$, $(1, 4, 0)$, $(0, 0, 5)$ and $(1, 5, 0)$ linearly independent or dependent in the vector space R^3 over the real field?
- What is the standard basis of the vector space $R_2[x]$, set of all real polynomials of degree less than or equal to 2, over the real field?
- What is the value of the inner product $(x, 0) \forall x \in V$ in an inner product space V ?
- Let $T: R^3 \rightarrow R^3$ be a linear transformation defined by $T(x, y, z) = (x, y, 0), \forall (x, y, z) \in R^3$. Find the kernel of T .
- Let $T: V \rightarrow W$ be a one-one linear transformation. Find the kernel of T .
- If a vector space V is isomorphic to the vector space R^3 over the real field, then what is the dimension of V ?
- Is λ is an eigenvalue of a non-singular matrix A , then what is the eigenvalue of the matrix A^{-1} ?
- Let $T: R^3 \rightarrow R^2$ be a linear transformation defined by
 $T(x, y, z) = (3x + 2y - 4z, x - 5y + 3z)$.
Find the matrix of T relative to the basis $(1, 1, 1), (1, 1, 0), (1, 0, 0)$ of R^3 and $(1, 3), (2, 5)$ of R^2 .
- Find the eigenvalues of the matrix $A = \begin{pmatrix} 1 & 3 \\ 4 & 5 \end{pmatrix}$.
- What are the eigenvalues of a real symmetric matrix?

15. Let $A = \begin{pmatrix} 1 & 3 \\ 4 & 5 \end{pmatrix}$ and B is the diagonal matrix with eigenvalues of A as diagonal elements.
If $B = P^{-1}AP$, then find P .