



Parul University

Faculty of Engineering & Technology

Department of Applied Sciences and Humanities

1st Year B. Tech Programme (Mathematics and Computing)

Linear Algebra - 03161151

Tutorial-4 Inner Product Space

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1. Define an inner-product space over the real numbers and give an example.
 2. State the Cauchy-Schwarz inequality for an inner-product space.
 3. Normalize the vector $A = (3,4)$ to make it a unit vector.
 4. Given $A = (1,0,0)$ and $B = (0,1,0)$, are they orthonormal?
 5. Find an orthonormal basis for the set of vectors $A = (1,1)$ & $B = (-1,1)$.
 6. Find a vector orthogonal to $(2,1,0)$ in \mathbb{R}^2 and compute their angle after normalization.
 7. Compute an orthonormal basis for \mathbb{R}^2 starting with $(1,0)$ $(0,1)$ and find the angle between the basis vectors.
 8. Compute the distance between $(1,0)$ and $(0,1)$ in \mathbb{R}^2 and verify the triangle inequality with $(0,0)$.
 9. Prove that orthogonal vectors satisfy the Pythagorean Theorem in an inner-product space.
 10. Find a vector orthogonal to $(0,1,-1)$ in \mathbb{R}^3 Compute their angle after normalization.