



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

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 R^3 and compute their angle after normalization.
7. Compute an orthonormal basis for 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 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 R^3 . Compute their angle after normalization.