

M.Tech. (2 Year) Data Science
Linear Algebra & Advanced Calculas
Test-III, Assignment

- Q.1 Define Inner Product on a vector space and give any two examples.
- Q.2 If $\alpha = (a_1, a_2, a_3 \dots \dots \dots a_n)$
& $\beta = (b_1, b_2, b_3 \dots \dots \dots b_n)$
are two vectors in $V_n(C)$ then show that inner product defined by
 $(\alpha, \beta) = a_1 \bar{b}_1 + a_2 \bar{b}_2 + \dots \dots \dots + a_n \bar{b}_n$ will be standard inner product space.
- Q.3 State and prove Cauchy-Schwarz inequality.
- Q.4 Using Gram Schmidt orthogonalization process find the normal orthogonal basis for $B = \{\beta_1, \beta_2, \beta_3\}$ where
 $\beta_1 = (1, 0, 1)$
 $\beta_2 = (1, 0, -1)$
 $\beta_3 = (0, 3, 4)$
- Q.5 Obtain Taylor's formula for the function e^{x+y} at $(0, 0)$ for $n=3$
- Q.6 Expand $f(x, y) = x^2 + 2x + y^2$ in powers of $(x - 2)$ and $(y - 3)$
- Q.7 Discuss the maximum or minimum value of the function.
 $f(x, y) = x^3 - 4xy + 2y^2$
- Q.8 Discuss the Lagrange's condition for maxima and minima in two variables.