**St. Xavier’s College (Autonomous), Kolkata**

**Department of Statistics**

**Problem Set 4**

**MDSC 4113/SEM I/CORE3 DATE:**

1. Let S be the 2‐dimensional subspace of spanned by the orthogonal vectors **v** 1 = (1, 2, 1) and **v** 2 = (1, −1, 1). Write the vector **v** = (−2, 2, 2) as the sum of a vector in S and a vector orthogonal to S.
2. Let *P* be the subspace of  specified by the equation 2 *x* + *y* = 2 *z* = 0. Find the distance between P and the point q = (3, 2, 1).
3. Let *H*  be the 3‐dimensional subspace of  with basis B = {}
4. Find an orthogonal basis for *H*
5. Then by normalizing these vectors—an orthonormal basis for *H*.
6. What are the components of the vector **x** = (1, 1, −1, 1) relative to this orthonormal basis?
7. What happens if you attempt to find the components of the vector **y** = (1, 1, 1, 1) relative to the orthonormal basis?
8. Find the Kronecker product of the following matrices and verify that A⊗B :
9. A = .
10. A =

[Solution: A<-matrix(c(1,2,3,4), byrow=T, ncol=2)

B<-matrix(c(0,5,6,7), byrow=T, ncol=2)

A%x%B]

1. Let . Find u⊗u, u⊗v, v⊗u and v⊗v
2. Let A = . Find rank(A), rank(B) and rank(A ⊗ B).