LINEAR ALGEBRA (MA20105)

Short Test (2020)- II:

$\mathbb{R}$ will denote the field of real numbers

Answer all question!

1. Let $\alpha, \beta \in \mathbb{R}^n$ be two vectors in $\mathbb{R}^n$ such that they are orthogonal to each other. Prove that $||\alpha - \beta||^2 + ||\alpha + \beta||^2 = ||\alpha||^2 + ||\beta||^2$. [2 marks]

2. Let W be the subspace of $\mathbb{R}^3$ generated by $(1, 1, 0)$, $(2, 3, 0)$. Let $b = (11, 13, 17)$ be any point in $\mathbb{R}^3$. Find the projection point p onto the space W. Write down the formula for the projection matrix Q. Then calculate Q and verify $Qb = p$. [1+5+1+1] marks