Assignment 16

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Abstract

This document illustrates about projections onto independent subspaces.

Download the latex-tikz codes from

https://github.com/priya6971/matrix_theory_EE5609/tree/master/Assignment16

1 Problem

If E_1 and E_2 are the projections of independent subspaces, then $E_1 + E_2$ is a projection.True or False?

2 Solution

Definition	If V is a vector space, a projection of V is a linear operator E on V such that $E^2 = E$
Proof	Assume projection matrices in $R^{2\times2}$ Let $E_1 = \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ Let $E_2 = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$ Now, E_1 is a projection of R^2 onto its first coordinate And E_2 is a projection of R^2 onto its second coordinate $E = E_1 + E_2 = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ $E^2 = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ $E \neq E^2$ Here, $E_1 + E_2$ is not equal to its square and hence its not a projection.
Conclusion	With the help of above proof we can say that the given statement is false.

TABLE 1: Illustration of Proof