

Assignment-11

Satyam Singh
EE20MTECH14015

Abstract—This assignment deals with vector sub spaces.

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<https://github.com/satyam463/Assignment-11/blob/main/Assignment%2011.tex>

1 PROBLEM STATEMENT

Let \mathbf{W}_1 and \mathbf{W}_2 be sub spaces of a vector space \mathbf{V} such that the set-theoretic union of \mathbf{W}_1 and \mathbf{W}_2 is also a sub space. Prove that one of the spaces \mathbf{W}_i is contained in the other.

2 SOLUTION

Since \mathbf{W}_1 and \mathbf{W}_2 are sub spaces of a vector space \mathbf{V} then we have $\mathbf{W}_1 \cup \mathbf{W}_2$ is sub spaces of a vector space \mathbf{V}

Let $a \in \mathbf{W}_1$

$$\mathbf{W}_1 \cup \mathbf{W}_2 = \mathbf{W}_1 \implies \mathbf{W}_2 \subseteq \mathbf{W}_1 \quad (2.0.1)$$

Therefore $a \in \mathbf{W}_2$, 2.0.1 which shows union of \mathbf{W}_1 and \mathbf{W}_2 are sub spaces if one sub space is contained in other. Hence $\mathbf{W}_2 \subseteq \mathbf{W}_1$