

title: Premier Proof Presentation: Axler 1.C.12  
course: 20math530  
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source: KBe2020math530refExr0nRetIndex

## 1 | Lemma

Prove that the union of two subspaces of  $V$  is a subspace of  $V$  if and only if one of the subspaces is contained in the other.

#incomplete ... this got deleted? I guess see KBe20math530PremierProofPresentation-export.pdf

## 2 | Working it out

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1.c ex 12 on 12 Sep 2020  
 $A, B$  sub V Union of  $A, B$  is sub V

if  $A \cup B = A$  or  $A \cup B = B$   
 Now, assume  $A \cup B$  is a subspace:  $\hookrightarrow$  directly shows union is

thus, it must be closed under a subspace, because  $A$  and  $B$  are already subspaces addition. if they were not

contained one within other,

$\Rightarrow a+b \in A \cup B$  (subspace closed)

assume  $a \in A, b \in B, a \notin B, b \notin A$

if  $a+b \in A$

then  $b = (a+b) - a$

$\therefore a+b \in A$  or  $a+b \in B$

$\therefore a+b \in A \therefore b \in A$

contradiction

$\Rightarrow$