Source: [KBe2020math530refExr0nRetIndex]

1 | **Problem**

Do subspaces form a group under subspace addition? - Properties for a group: [KBe2020math530refGroups] - Closed - Identity - Inverses - Associative

2 | **Working it out**

I don't actually remember the exact definition of subspace addition. If I remember correctly from the proof of Axler exercise 1.C.14, the sum of two subspaces is the subspace where each vector is the sum of two vectors in the original two subspaces?

I don't remember if it was guaranteed to be a subspace, but it must have the identity (because the constituents both had the identity), it is closed under scalar multiplication (because you could take the sum apart, multiply the bits from each smaller subspace which are closed under scalar multiplication, and then put them back together again). I think it is closed under addition because both parts are closed under addition. This is by no means a rigorous proof, but it is as close as I can get without knowing the actual definition of a subspace sum, and I think its reasonably convincing.

If the above is true, then subspaces are closed under subspace addition.
