



## SUBSPACE SUMS

### Why

#### Definition

The *sum* of two subspaces is the span of their union. So then the sum of two subspaces is also a subspace. If the intersection of two subspaces is the zero subspace, we call the sum a *direct sum*.

#### Notation

Let  $U$  and  $V$  be subspaces of a vector space. We denote the sum of  $U$  and  $V$  by  $U + V$ . We can express

$$U + V = \text{span}(U + V).$$

Let  $\mathbf{0}$  denote the zero vector. If  $S_1 \cap S_2 = \{\mathbf{0}\}$

TODO: something about uniqueness of representation

