__Defn__ A vector space is a nonempty set V of objects called vectors which can be added and multiplied by scalars (real numbers) subject to the following axioms:

* 1. If $\bar{u}, \bar{v} \in V$, then $\bar{u}+\bar{v} \in V$. (closure under addition)

2. $\bar{u}+\bar{v} = \bar{v}+\bar{u}$ (commutative addition)

3. $\bar{u}+(\bar{v}+\bar{w}) = (\bar{u}+\bar{v})+\bar{w}$ (associative addition)

* 4. There is a zero vector $\bar{0} \in V$ such that $\bar{u}+\bar{0} = \bar{u}$ for all $\bar{u} \in V$. (additive identity)

5. For each $\bar{u} \in V$ there is a vector $-\bar{u} \in V$ such that $\bar{u}+(-\bar{u}) = \bar{0}$. (additive inverse)

* 6. If $\bar{u} \in V$ and c is a scalar, then $c\bar{u} \in V$. (closure under scalar multiplication)

7. $c(\bar{u}+\bar{v}) = c\bar{u}+c\bar{v}$ (distribution)

8. $(c+d)\bar{u} = c\bar{u}+d\bar{u}$ (distribution)

9. $c(d\bar{u}) = (cd)\bar{u}$ (associative scalar mult)

10. $1\bar{u} = \bar{u}$ (multiplicative identity)