Linear Functions

1 Why

Lots of things are (approximately) linear

2 Definition

A function between two vector spaces which share the same field is *linear* if the function applied to a linear combination of two vectors in the first space equals the linear combination of the results of the function (in the second place), using the same coefficients for the combination.

A linear function is always linear with respect to some field. The field is implicit, somewhat, in the definition but always present.

Linear functions are sometimes called *operators*

2.1 Notation

Let (V_1, F) and (V_2, F) be two vector spaces over the same field. Let $f : V_1 \to V_2$. We say that f is *linear* if

$$f(au + bv) = af(u) + bf(v)$$

for all $a, b \in F$ and $u, v \in V_1$.