



# Linear Transformations

## 1 Definition

An transformation is *linear* if a linear combination of the result of a linear combination of two vectors in the first space is the linear combination (with the same coefficients) of the result in the second space.

### 1.1 Notation

Let  $(V_1, F)$  and  $(V_2, F)$  be two vector spaces over the same field. Let  $f : V_1 \rightarrow V_2$ .  $f$  is linear means

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

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