Source:

1 | **Definition**

#definition Axler3.2 Linear Map #aka linear transformation A *linear map* from V to W is a function $T : V \to W$ with the following properties:

1.1 | **Additivity**

$$T(u + v) = Tu + Tv \forall u, v \in V$$

1.2 | **Homogenity**

$$T(\lambda v) = \lambda(Tv) \forall \lambda \in \mathbb{F}, v \in V$$

2 | **Other Notation**

2.1 | **Set of Maps**

#definition Axler3.3 $\mathcal{L}(V, W)$

The set of all linear maps from V to W is denoted $\mathcal{L}(V, W)$.

3 | **Examples**

3.1 | **zero (0)**

Zero is a function $0 : V \to W$ s.t. $0v = 0 \forall v \in V$. (It takes all vectors in V and maps them to the additive identity of W)

3.2 | **identity (I)**

The identity maps each from one vector space to itself (in the same vector space):

$$I \in \mathcal{L}(V, V), v \in V : Iv = v$$

3.3 | **differentiation (D)**

$$D \in \mathcal{L}(\mathcal{P}(\mathbb{R}), \mathcal{P}(\mathbb{R})) : Dp = p'$$