Source:

1 | Definitions

1.1 | affine subset

An affine subset of a vector space V is of the form $U + v$ where $U \subseteq V$ and $v \in V$.

1.2 | product space

The product of some vector spaces $V_1 \times \cdots \times V_n$ is the set of lists of vectors with one from each respective space:

$$\{(v_1, \ldots, v_n) : v_1 \in V_1, \ldots, v_n \in V_n\}$$

1.3 | quotient space

A quotient space V/U is the set of affine subsets $\{U + v : v \in V\}$ (although some of those affine subsets are equivalent).

1.4 | equivalence relation

An equivalence relation is a set of elements that are considered equivalent (equal to eachother). For example, in a vector space U, $U + 0 = U + u \forall u \in U$.

2 | Why ”product” and ”quotient” are used to describe these operations