Definition 1 (Affine Function) *We say a function* $A : \mathbb{R}^m \to \mathbb{R}^n$ *is* ***affine*** *if there is a linear function* $L : \mathbb{R}^m \to \mathbb{R}^n$ *and a vector* b *in* $\mathbb{R}^n$ *such that*

$$A(x) = L(x) + b \tag{1}$$

$\forall x$ in $\mathbb{R}^m$.

An *affine* function is just a linear function plus a translation. From our knowledge of linear functions, it follows that if $A : \mathbb{R}^m \to \mathbb{R}^n$ is *affine*, then there is an $n \times m$ matrix M and a vector b in $\mathbb{R}^n$ such that

$$A(x) = Mx + b \tag{2}$$

$\forall x$ in $\mathbb{R}^m$. In particular, if $f : \mathbb{R} \to \mathbb{R}$ is *affine*, then there are real numbers m and b such that

$$f(x) = mx + b \tag{3}$$

for all real numbers x.