Three vector spaces: $\mathbb{R}^2$, $M_{2\times3}$, $\mathcal{F}(\mathbb{R}:\mathbb{R})$

functions from $\mathbb{R}$ to $\mathbb{R}$

$\mathbb{R}^2$: Let $\bar{u} = \begin{bmatrix} u_1 \\ u_2 \end{bmatrix}$, $\bar{v} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$ e.g. $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

$M_{2\times3}$: Let $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}$ $B = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \end{bmatrix}$ e.g. $\begin{bmatrix} 1 & 7 & 9 \\ 2 & 5 & 0 \end{bmatrix}$

$\mathcal{F}(\mathbb{R};\mathbb{R})$: let $f = f(x)$, $x \in \mathbb{R}$ $g = g(x)$, $x \in \mathbb{R}$ e.g. $f(x) = x^2$, $x \in \mathbb{R}$

In $\mathbb{R}^2$, $\bar{u} = \bar{v}$ if ...

In $M_{2\times3}$, $A = B$ if ...

In $\mathcal{F}(\mathbb{R};\mathbb{R})$, $f = g$ if ...

In $\mathbb{R}^2$, $\bar{u} + \bar{v}$ is given by $\begin{bmatrix} \quad \\ \quad \end{bmatrix}$

In $M_{2\times3}$, $A+B$ is given by...

In $\mathcal{F}(\mathbb{R},\mathbb{R})$ $f+g$ is given by...

Let c be a scalar.

In $\mathbb{R}^2$, $c\bar{u}$ is given by $\begin{bmatrix} \\ \end{bmatrix}$

In $M_{2\times 3}$, cA is given by...

In $\mathcal{F}(\mathbb{R};\mathbb{R})$, cf is given by...

In $\mathbb{R}^2$, the zero vector is given by $\bar{0} = \begin{bmatrix} \\ \end{bmatrix}$

check: $\bar{u} + \bar{0} = \begin{bmatrix} \\ \end{bmatrix} + \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} = \bar{u}$

In $M_{2\times 3}$, the zero vector is given by $Z = \begin{bmatrix} \\ \end{bmatrix}$

check: $A + Z =$

In $\mathcal{F}(\mathbb{R};\mathbb{R})$, the zero vector is given by $z = z(x) =$ for all x.

check: $f + z =$