



(c) Let  $\mathbf{u}, \mathbf{v}, \mathbf{w} \in \mathbb{R}^n$  be given. Show that  $(\mathbf{u} + \mathbf{v}) \cdot \mathbf{w} = \mathbf{u} \cdot \mathbf{w} + \mathbf{v} \cdot \mathbf{w}$ .

(d) Let  $\mathbf{u}, \mathbf{v} \in \mathbb{R}^n$  and  $c \in \mathbb{R}$ . Show that  $(c\mathbf{u}) \cdot \mathbf{v} = \mathbf{u} \cdot (c\mathbf{v}) = c(\mathbf{u} \cdot \mathbf{v})$ .

(e) Let  $L : \mathbb{R}^n \rightarrow \mathbb{R}^m$  be a linear transformation. Show that  $L(\mathbf{0}_{\mathbb{R}^n}) = \mathbf{0}_{\mathbb{R}^m}$ .