Turn-in #4 1.8 # 24

If $\{\vec{v}_1, \ldots, \vec{v}_p\}$ span $\mathbb{R}^n$ then any $\vec{v} \in \mathbb{R}^n$ is a linear combination of the $\vec{v}_i$, that is

$$\vec{v} = c_1\vec{v}_1 + c_2\vec{v}_2 + \cdots + c_p\vec{v}_p$$

$thus$

$$\begin{aligned} T(\vec{v}) &= T(c_1\vec{v}_1 + c_2\vec{v}_2 + \cdots + c_p\vec{v}_p) \\ &= T(c_1\vec{v}_1) + T(c_2\vec{v}_2) + \cdots + T(c_p\vec{v}_p) \\ &= c_1T(\vec{v}_1) + c_2T(\vec{v}_2) + \cdots + c_pT(\vec{v}_p) \\ &= c_1\vec{0} + c_2\vec{0} + \cdots + c_p\vec{0} \\ &= \vec{0} + \vec{0} + \cdots + \vec{0} \\ &= \vec{0} \end{aligned}$$