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SM 261 – Matrix Algebra – Quiz 9
Section 1.8 – Introduction to Linear Transformations

1. Let $T: \mathbb{R}^n \rightarrow \mathbb{R}^m$ be a linear transformation, and let $\{\vec{v}_1, \vec{v}_2\}$ be a linearly dependent set in \mathbb{R}^n . Assume that neither \vec{v}_1 nor \vec{v}_2 are the zero vector. Show that $\{T(\vec{v}_1), T(\vec{v}_2)\}$ is a linearly dependent set.

① Since $\{\vec{v}_1, \vec{v}_2\}$ are linearly dependent then
 $\vec{v}_2 = k\vec{v}_1$

② $\therefore T(\vec{v}_2) = T(k\vec{v}_1) = kT(\vec{v}_1)$

③ $\therefore \{T(\vec{v}_1), T(\vec{v}_2)\} = \{T(\vec{v}_1), kT(\vec{v}_1)\}$

④ $\therefore \Downarrow \Rightarrow$ Therefore this forms a dependent set since transformed vectors are multiples of each other