Note: if we use a basis for $\mathbb{R}^n B = \{\vec{u}_1, \vec{u}_2 \cdots \vec{u}_n\}$, instead of the usual orthonormal basis, then in the new basis out coordinates for $\vec{x} \in mathbbR^n$ are $\vec{y} = [\vec{x}]_B = \vec{P}^{-1}\vec{x}$, since we know that $\vec{x} = \vec{P}\vec{y}$. Then, we have: