

MAC 3105-2A
Quiz 6
06/29/2017

Print Name _____

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1. Let \mathbb{R}^4 be the 4-dim vector space. Let \mathcal{B}_1 and \mathcal{B}_2 be bases of \mathbb{R}^4 . Let u be a vector in \mathbb{R}^4 with coordinate $[1, 2, 3, 4]^T$ under \mathcal{B}_1 . Find the coordinate of the vector u under \mathcal{B}_2 . Here

$$\mathcal{B}_1 = \left\{ \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \end{bmatrix}; \begin{bmatrix} 3 \\ 0 \\ 2 \\ 2 \end{bmatrix}; \begin{bmatrix} 1 \\ 3 \\ -3 \\ 3 \end{bmatrix}; \begin{bmatrix} 5 \\ 1 \\ 2 \\ 1 \end{bmatrix} \right\}; \mathcal{B}_2 = \left\{ \begin{bmatrix} 2 \\ 0 \\ 0 \\ 0 \end{bmatrix}; \begin{bmatrix} 3 \\ 1 \\ 0 \\ 0 \end{bmatrix}; \begin{bmatrix} 3 \\ 3 \\ 1 \\ 0 \end{bmatrix}; \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} \right\}.$$

2. Let

$$\mathcal{B} = \left\{ \begin{bmatrix} 1 \\ 0 \\ 5 \end{bmatrix}; \begin{bmatrix} 2 \\ 1 \\ 6 \end{bmatrix}; \begin{bmatrix} 3 \\ 4 \\ 0 \end{bmatrix} \right\}$$

be a basis of \mathbb{R}^3 . Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be a linear transform such that T sends

$$\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}_{\mathcal{B}} \mapsto \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}_{\mathcal{B}}; \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}_{\mathcal{B}} \mapsto \begin{bmatrix} 2 \\ 2 \\ 1 \end{bmatrix}_{\mathcal{B}}; \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}_{\mathcal{B}} \mapsto \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}_{\mathcal{B}}.$$

Find the matrix that represents T under the **Standard** basis of \mathbb{R}^3 .