Quiz 6

Name : _____

SID : _____

1. Let a subset W of $M_{2\times 3}$ be given as

$$W = \left\{ A \in M_{2\times 3} | \, A \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \right\}.$$

Is W a subspace of $M_{2\times 3}$? Why or why not?

2. Let $\mathcal{B} = \left\{ \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \\ 7 \end{pmatrix} \right\}$ be a basis for $\mathbb{R}^3$.

   a) Explain why $P_{\mathcal{B}}$ is the matrix obtained by attaching basis vectors side by side. (Recall that the definition of $P_{\mathcal{B}}$ is the matrix satisfying

   $$v = P_{\mathcal{B}} \cdot [v]_{\mathcal{B}}$$

   for all $v \in \mathbb{R}^3$.)

   b) Find $v \in \mathbb{R}^3$ such that $[v]_{\mathcal{B}} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$.