Quiz 5

Your name: _____

1. [8 points]

(a) [2 points] Show that the vectors $\mathbf{v_1} = \begin{bmatrix} 4 \\ -3 \end{bmatrix}$ and $\mathbf{v_2} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ are orthogonal.

(b) [2 points] If $\mathbf{v_1}$ and $\mathbf{v_2}$ are not orthonormal then normalize them to form an orthonormal set of corresponding vectors $\mathbf{q_1}$ and $\mathbf{q_2}$.

(c) [4 points] Find the coordinate vector $[\mathbf{w}]_{\mathcal{B}}$ of $\mathbf{w} = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ with respect to the basis $\mathcal{B} = \{\mathbf{q_1}, \mathbf{q_2}\}$.

2. [7 points] Determine whether $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ is diagonalizable and, if so, find an invertible matrix P and a diagonal matrix D such that $P^{-1}AP = D$.

bonus problem [5 points extra] Show that the matrices $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ are similar.