Quiz 9, Linear Algebra

Fall 2017, Dr. Adam Graham-Squire

Name: _____

1. (4 points) Let $\mathbf{v} = \begin{bmatrix} a \\ b \end{bmatrix}$. Describe the set H of vectors $\begin{bmatrix} x \\ y \end{bmatrix}$ that are orthogonal to $\mathbf{v}$. (Hint: you will need to look at two cases, one where $\mathbf{v} = 0$ and one where $\mathbf{v} \neq 0$.)

2. (4 points) Let $\mathbf{y} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ and $\mathbf{u} = \begin{bmatrix} 5 \\ -6 \end{bmatrix}$. Write $\mathbf{y}$ as the sum of two orthogonal vectors, one in Span$\{\mathbf{u}\}$ (usually denoted as $\hat{\mathbf{y}}$) and one orthogonal to $\{\mathbf{u}\}$.

3. (2 points) Determine if the vectors are orthonormal. If they are orthogonal but *not* orthonormal, normalize them to be orthonormal.

$$\begin{bmatrix} -2/3 \\ 1/3 \\ 2/3 \end{bmatrix}, \begin{bmatrix} 1/3 \\ 2/3 \\ 0 \end{bmatrix}$$