Name: _____ **Quiz 1**

Math 362 Linear Algebra – Crawford **13 September 2017**

Books, calculators, and notes (in any form) are not are allowed. Show all your work for credit. ***Good luck!***

[Note: Each quiz score will be scaled to 15 points after grading.]

1. (8 pts) Given $\mathbf{a_1} = \begin{bmatrix} 1 \\ 3 \\ 2 \end{bmatrix}$, $\mathbf{a_2} = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$, $\mathbf{a_3} = \begin{bmatrix} -3 \\ -2 \\ 1 \end{bmatrix}$.

(a). Determine whether $\mathbf{b} = \begin{bmatrix} -2 \\ 5 \\ 4 \end{bmatrix}$ is a linear combination of $\mathbf{a}_1, \mathbf{a}_2$ and $\mathbf{a}_3$.

If it is, find the weights and write $\mathbf{b}$ as the linear combination found.

[Don't forget to write $\mathbf{b}$ as a linear combination found, if found.]

(b). Do $\mathbf{a}_1, \mathbf{a}_2$ and $\mathbf{a}_3$ span $\mathbb{R}^3$? [No explanation necessary.]

2. (2 pts) Write a matrix equation that is equivalent to the following vector equation.

$$c_1 \begin{bmatrix} -2 \\ 5 \end{bmatrix} + c_2 \begin{bmatrix} -3 \\ 0 \end{bmatrix} + c_3 \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$$

3. (10 pts)

(a). Given $\mathbf{u} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$, show that $\begin{bmatrix} h \\ k \end{bmatrix}$ is in Span $\{\mathbf{u}, \mathbf{v}\}$ for all h and k. [Briefly explain how you know.]

(b). Given $\mathbf{u} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$, determine a relationship between h and k such that $\begin{bmatrix} h \\ k \end{bmatrix}$ is in Span $\{\mathbf{u}, \mathbf{v}\}$.

(c). Give a geometric description of and/or sketch the set of all vectors $\begin{bmatrix} h \\ k \end{bmatrix}$ that satisfy the relationship found it part (b). [Hint: Use the relationship from (b) to rewrite the vector $\begin{bmatrix} h \\ k \end{bmatrix}$.]