Math 214 - April 3, 2020

Quiz 7

Name: _____

Directions: Complete the following quiz on paper. Show all work necessary to receive full credit. Circle your final answer.

At the end of the quiz you will approximately 10 minutes to take pictures of your responses and upload a PDF copy of them to Moodle. Before we begin, ensure your work space is free of any notes or books and that your camera is set up to give a good view of you and your work space **without displaying your answers** as you write them. During the quiz you may ask questions through Zoom private chat and Breakout rooms.

1. Determine if the following subset H is a subspace of the given vector space V.

   (a) Let $H = \left\{ \begin{bmatrix} 2a-3b \\ 3a+4b \\ 2a+b \\ a \end{bmatrix} : a, b \in \mathbb{R} \right\} \subseteq \mathbb{R}^4$ and $V = \mathbb{R}^4$.

   (b) Let $H = \left\{ \begin{bmatrix} 1 & a \\ b & c \end{bmatrix} | a, b, c \in \mathbb{R} \right\} \subseteq M_{2\times 2}$ and $V = M_{2\times 2}$.

2. The null space of a $m \times n$ matrix A is a subspace of _____.

3. The column space of a $m \times n$ matrix A is a subspace of _____.

4. Let $A = \begin{bmatrix} -2 & 4 & -2 & -4 \\ 2 & -6 & -3 & 1 \\ 3 & 8 & 2 & -3 \end{bmatrix}$ by row equivalent to $B = \begin{bmatrix} 1 & 0 & 6 & 5 \\ 0 & 2 & 5 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$.

   (a) Find an explicit description for $\text{Nul}(A)$.

   (b) Find a basis for $\text{Col}(A)$.

5. Determine which of the set $\left\{ \begin{bmatrix} 1 \\ 3 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 5 \end{bmatrix} \right\}$ is a basis for $\mathbb{R}^3$. Be sure to justify your answer.