MATH221
quiz #1, 03/01/18
Total Possible 100

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.

Show all work legibly. **Name**:_____

1. (20) Find a if $x_3 = 2$ and

$$\begin{array}{rrrcl} 2x_1 & & -4x_3 & = & a \\ & x_2 & +3x_3 & = & 2 \\ x_1 & +5x_2 & +8x_3 & = & 0 \end{array}$$

$a =$

2. (20) Let $A = [\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3] = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 5 & 0 \end{bmatrix}$. True or False? The vector $\mathbf{v} = \begin{bmatrix} 8 \\ -4 \\ -16 \end{bmatrix}$ is a linear combination of $\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3$.

Mark one and explain.

▫ True ▫ False

3. (20) True or False? The matrix $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 5 & 0 \end{bmatrix}$ is invertible.

Mark one and explain.

□ True   □ False

4. (20) Let $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 5 & 0 \end{bmatrix}$. Define a linear transformation $T : \mathbf{R}^3 \to \mathbf{R}^3$ by $T\mathbf{x} = A\mathbf{x}$.

True or False? T is onto.

Mark one and explain.

□   True   □   False

5. (20) Let $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 5 & 0 \end{bmatrix}$. Define a linear transformation $T : \mathbf{R}^3 \to \mathbf{R}^3$ by $T\mathbf{x} = A\mathbf{x}$.

True or False? T is one-to-one.

Mark one and explain.

□ True   □ False

6. (20) Let A be an $n \times n$ matrix so that for each $\mathbf{b} \in \mathbf{R}^n$ the system $A\mathbf{x} = \mathbf{b}$ is consistent. True or False? A^{-1} exists.

Mark one and explain.
◻ True   ◻ False