**MATH221**

quiz #2, 10/14/14

Total 100

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

1. (20) Let $T$ be a linear transformation from $\mathbf{R}^2$ to $\mathbf{R}^3$ so that $T(\mathbf{e}_1) = \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$, and $T(\mathbf{e}_2) = \begin{bmatrix} -3 \\ 5 \\ 7 \end{bmatrix}$.

   True or False? There is $\mathbf{x} \in \mathbf{R}^2$ so that $T(\mathbf{x}) = \begin{bmatrix} -2 \\ 8 \\ 6 \end{bmatrix}$.

   Mark one and explain.

   ▫ False ▫ True $x_1 =$ $x_2 =$

2. (20) True or False? If the equation $A\mathbf{x} = \mathbf{b}$ has two solutions $\mathbf{x}_1 \neq \mathbf{x}_2$, then the columns of $A$ are linearly independent.

Mark one and explain.

☐ True ☐ False

3. (20) Let $A$ and $B$ be two $3 \times 3$ matrices, so that the first column of $B$ is all zeros. True or False? The first column of $AB$ is all zeros.

Mark one and explain.

☐ False ☐ True

4. (20) Find $A^{-1}$, where

$$A = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & 2 \\ 4 & -3 & 8 \end{bmatrix}.$$

$A^{-1} =$

5. (20) Let $A$ and $B$ be $n \times n$ matrices. True or False? If $AB$ is invertible, then $B$ is invertible.

Mark one and explain.

☐ True ☐ False

6. (20) Let $T : \mathbf{R}^n \to \mathbf{R}^n$ be a linear transformation so that $T(\mathbf{x}_1) = T(\mathbf{x}_2)$ for a pair of vectors $\mathbf{x}_1 \neq \mathbf{x}_2$. True or False? $T$ is an invertible linear transformation.

Mark one and explain.

☐ True ☐ False