Name:

**MATH221**
test #3, 12/1/16
Sections 4.1-4.6
Total 100

Show all work legibly.

1. (25) Let $T$ be a linear transformation from $\mathbf{P}_2$ to $\mathbf{R}^2$ defined by $T(\mathbf{p}) = \begin{bmatrix} \mathbf{p}(0) \\ \mathbf{p}(1) \end{bmatrix}$.

   Find $A$ the standard matrix of the transformation (the standard basis for $\mathbf{P}_2$ is $\{1, \mathbf{x}, \mathbf{x}^2\}$).

$A =$

2. (25) Let $A$ be an $n \times n$ matrix. Consider the set $\mathcal{X}$ of all $n \times n$ matrices that satisfy $AX = 0$. True or False? $\mathcal{X}$ is a vector space.

Mark one and explain.

▫ True ▫ False

3. (30) Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 6 \\ 0 & 4 & 5 \end{bmatrix}$.

(a) (15) Find $\dim \operatorname{Row} A$.

$\dim \operatorname{Row} A =$

(b) (15) Find $\dim \operatorname{Nul} A$.

$\dim \operatorname{Nul} A =$

4. (20) Consider a two function set $S = \{x, e^x\}$. True or False? $S$ is a linearly independent set.

Mark one and explain.

▫ True ▫ False