Written Homework #5. Math 202 Due Friday, October 23

Name: _____ Section: _____

1. Compute the following matrix operations, or explain why they are undefined.

$$A = \begin{bmatrix} 1 & 3 & 0 \\ 4 & 1 & 0 \\ -1 & 0 & 6 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & -1 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 3 \\ 4 & -1 \end{bmatrix}$$

(a) $2A - B$

$= 2\begin{bmatrix} 1 & 3 & 0 \\ 4 & 1 & 0 \\ -1 & 0 & 6 \end{bmatrix} + (-1)\begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & -1 \end{bmatrix}$

$=$

(b) $AB - 2I_3$

$= \left(\begin{bmatrix} 1 & 3 & 0 \\ 4 & 1 & 0 \\ -1 & 0 & 6 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & -1 \end{bmatrix} \right) + (-2)\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$=$

(c) $2A + 4C$

$=$

Name: _____ Section: _____

2. For each of the following, compute the product or explain why it is undefined.

(a) $\underset{3\times 2}{\begin{bmatrix} 1 & 2 \\ 4 & 0 \\ 3 & 0 \end{bmatrix}} \cdot \underset{2\times 3}{\begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & -1 \end{bmatrix}}$

(b) $\underset{2\times 3}{\begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & -1 \end{bmatrix}} \cdot \underset{2\times 3}{\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{bmatrix}}$

(c) $\underset{2\times 3}{\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{bmatrix}} \cdot \underset{3\times 2}{\begin{bmatrix} 1 & 2 \\ 4 & 0 \\ 0 & 3 \end{bmatrix}}$

Name: _____ Section: _____

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

(a) Compute the inverse of A, or explain why it does not exist.

reduce $[A|I_3]$ until you find $[I_3|A^{-1}]$

(b) Use A^{-1} to solve the equation $A\vec{x} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$.

Error Check: answer to (b) is $\vec{x} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$

Name: _____ Section: _____

4. Let $B = \begin{bmatrix} \vec{b}_1 & \vec{b}_2 \end{bmatrix}$. Suppose that $\vec{b}_2 = 3\vec{b}_1$.

Prove that that the columns of AB are linearly dependent.

Know $AB = \begin{bmatrix} A\vec{b}_1 & A\vec{b}_2 \end{bmatrix}$

Know $\vec{b}_2 = 3\vec{b}_1$

Want: dependence relation between $A\vec{b}_1$ & $A\vec{b}_2$

5. Use the properties of transpositions to rewrite $(A^T \cdot B^T)^T$. You must show all steps.

$$(A^T \cdot B^T)^T = (B^T)^T \cdot (A^T)^T$$
$$= B \cdot A$$

full answer.

6. Use the properties of inverses to rewrite $(A^{-1} \cdot B^{-1})^{-1}$. You must show all steps.