Group Quiz 4

Name: ___KEY___

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Math 111

No work = no credit
No Graphing Calculator

1.) (2 pts) What are the dimensions (the order) of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 7 & 8 & 9 & 10 & 11 & 12 \end{bmatrix}$?

$$2 \times 6$$

2.) (2 pts) If $B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$, what is $3B$?

$$\begin{bmatrix} 3 & 6 & 9 \\ 12 & 15 & 18 \\ 21 & 24 & 27 \end{bmatrix}$$

3.) (4 pts) If $C = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $D = \begin{bmatrix} 3 & 1 \\ 4 & -1 \end{bmatrix}$, what is $2C + 3D$?

$$2C + 3D = \begin{bmatrix} 11 & 7 \\ 18 & 5 \end{bmatrix}$$

4.) (4 pts) Find $\begin{bmatrix} 1 & 2 \\ 3 & -1 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 3 & 0 & 2 \\ -2 & 0 & 1 & 5 \end{bmatrix}$

$$\underset{3 \times 2}{} \qquad \underset{2 \times 4}{} = \begin{bmatrix} -3 & 3 & 2 & 12 \\ 5 & 9 & -1 & 1 \\ -2 & 0 & 1 & 5 \end{bmatrix}$$

5.) (3 pts) Suppose you solve the system $\begin{cases} Ax + By = C \\ Dx + Ey = F \end{cases}$ by setting up an augmented matrix and

solving using Gauss-Jordan elimination. Interpret the results if the resulting matrix is:

a.) $\begin{bmatrix} 1 & 0 & | & 3 \\ 0 & 1 & | & 4 \end{bmatrix}$ $x = 3$ & $y = 4$

b.) $\begin{bmatrix} 1 & 0 & | & 3 \\ 0 & 0 & | & 4 \end{bmatrix}$ No soln.

c.) $\begin{bmatrix} 1 & 2 & | & 3 \\ 0 & 0 & | & 0 \end{bmatrix}$ infinite soln.
$x + 2y = 3$

6.) (6 pts) Solve the system $\begin{cases} 2x + 6y = 4 \\ x - 7y = -8 \end{cases}$ by constructing an augmented matrix and using

Gauss-Jordan Elimination.

Soln 1

$\begin{bmatrix} 2 & 6 & | & 4 \\ 1 & -7 & | & -8 \end{bmatrix} \frac{1}{2}R_1 \to R_1$

$\Rightarrow \begin{bmatrix} 1 & 3 & | & 2 \\ 1 & -7 & | & -8 \end{bmatrix} R_2 - R_1 \to R_2$

$\Rightarrow \begin{bmatrix} 1 & 3 & | & 2 \\ 0 & -10 & | & -10 \end{bmatrix} -\frac{1}{10}R_2 \to R_2$

$\Rightarrow \begin{bmatrix} 1 & 3 & | & 2 \\ 0 & 1 & | & 1 \end{bmatrix} R_1 - 3R_2 \to R_1$

$\Rightarrow \begin{bmatrix} 1 & 0 & | & -1 \\ 0 & 1 & | & 1 \end{bmatrix}$

Soln 2

$\begin{bmatrix} 2 & 6 & | & 4 \\ 1 & -7 & | & -8 \end{bmatrix} R_1 \leftrightarrow R_2$

$\Rightarrow \begin{bmatrix} 1 & -7 & | & -8 \\ 2 & 6 & | & 4 \end{bmatrix} R_2 - 2R_1 \to R_2$

$\Rightarrow \begin{bmatrix} 1 & -7 & | & -8 \\ 0 & 20 & | & 20 \end{bmatrix} \frac{1}{20}R_2 \to R_2$

$\Rightarrow \begin{bmatrix} 1 & -7 & | & -8 \\ 0 & 1 & | & 1 \end{bmatrix} R_1 + 7R_2 \to R_2$

$\Rightarrow \begin{bmatrix} 1 & 0 & | & -1 \\ 0 & 1 & | & 1 \end{bmatrix}$

$x = -1$ & $y = 1$