

Name: _____ MATH 141, Section: _____

Also write your name on the BACK side of this quiz in the upper right hand corner.

Quiz 3, Form B Key

Show ALL work to get full credit.

1. (3 points) Suppose A is a 2×5 matrix and B is a 2×2 matrix. Determine the size of the following matrices. If an operation is not possible, write "not possible".

(a) AB Not Possible

(b) BA 2×5

(c) $B + A$ Not Possible

2. (3 points) If $A = \begin{bmatrix} 6 & 2 \\ 1 & -3 \\ 4 & 3 \end{bmatrix}$, what is $2A^T$?

$$2A^T = 2 \begin{bmatrix} 6 & 1 & 4 \\ 2 & -3 & 3 \end{bmatrix} = \begin{bmatrix} 12 & 2 & 8 \\ 4 & -6 & 6 \end{bmatrix}$$

3. (4 points) Let $A = \begin{bmatrix} a & 1 & 2 \\ 0 & 4 & b \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 \\ 0 & c \\ 5 & 1 \end{bmatrix}$. Calculate AB .

$$AB = \begin{bmatrix} 3a + 10 & -2a + c + 2 \\ 5b & 4c + b \end{bmatrix}$$

4. (5 points) Solve the following system of equations. If there are infinitely many solutions, give a parameterized form of the solution.

$$\begin{aligned} x + y - z &= -1 \\ x + 2y + 7z &= 3 \\ 4x + 7y + 20z &= 8 \end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & -1 \\ 1 & 2 & 7 & 3 \\ 4 & 7 & 20 & 8 \end{array} \right] \xrightarrow{\text{rref}} \left[\begin{array}{ccc|c} 1 & 0 & -9 & -5 \\ 0 & 1 & 8 & 4 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

The reduced matrix yields equations: $x - 9z = -5$ and $y + 8z = 4$

There is no contradiction and there is no single value for each variable. Thus, there are infinitely many solutions.

Let $z = t$, where t is any real number. Solving for the other variables yields:

$$x = -5 + 9t \text{ and } y = 4 - 8t$$

Solution: $(-5 + 9t, 4 - 8t, t)$