Precalculus Quiz #1 (Retake): Spring 2022

Name:

March 3, 2022

+15

1. A system of equations with an infinite number of solutions is...

A. inconsistent.
B. consistent.
C. asymmetric.
D. impossible.

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2. A **coefficient matrix** will always contain...

A. exactly three columns.
B. more columns than variables.
C. one row for every equation.
D. one column for every equation.

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3. The system of equations below has an infinite number of solutions:

$$\begin{cases} 3x + 2y + z = 8 \\ -6x + 2z = 4 \end{cases}$$

Which of the following is **not** a possible solution?

A. $x = 1, y = 0, z = 5$
B. $x = 0, y = 3, z = 2$
C. $x = 1, y = 1, z = 4$
D. $x = -1, y = 6, z = -1$

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4. $\begin{bmatrix} 1 & -3 \\ 0 & 0 \\ 5 & -3 \end{bmatrix} + \begin{bmatrix} 2 & 3 & 14 \\ 0 & 0 & 0 \end{bmatrix} =$

A. $\begin{bmatrix} -1 & 3 & 11 \\ 1 & 0 & 5 \end{bmatrix}$
B. $\begin{bmatrix} 3 & 3 & 19 \\ -3 & 0 & -3 \end{bmatrix}$
C. $\begin{bmatrix} 7 & 3 & 15 \\ -3 & 0 & -3 \end{bmatrix}$
D. Matrix addition is undefined here.

Show your work or explain your answer here:

These matrices have dimensions of 3x2 & 2x3 so they can't be added.

5. For the system of equations to the right,

+10 i. Convert to **augmented matrix** form

+20 ii. Use **Gaussian Elimination** to transform to row-echelon form

iii. Solve for x, y and z. For full credit use **Gauss-Jordan elimination**. For partial credit use back-substitition.

$$\begin{cases} x + 3y + 2z = 2 \\ 2x + 7y + 7z = -1 \\ 2x + 5y + 2z = 7 \end{cases}$$

+5 (substitution)

+10 (Gauss-Jordan)

$$\left[\begin{array}{ccc|c} 1 & 3 & 2 & 2 \\ 2 & 7 & 7 & -1 \\ 2 & 5 & 2 & 7 \end{array}\right] \xrightarrow{R1\times -2 + R2,\ R1\times -2 + R3} \left[\begin{array}{ccc|c} 1 & 3 & 2 & 2 \\ 0 & 1 & 3 & -5 \\ 0 & -1 & -2 & 3 \end{array}\right] \xrightarrow{R2 + R3} \left[\begin{array}{ccc|c} 1 & 3 & 2 & 2 \\ 0 & 1 & 3 & -5 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

Back-subs.

$z = -2$

$y + 3(-2) = -5$

$y = 1$

$x + 3(1) + 2(-2) = 2$

$x + 3 - 4 = 2$

$x - 1 = 2, \quad x = 3$

$x = 3$

$y = 1$

$z = -2$

Gauss-Jordan elimination.

Use this space to continue work on (5).

$$\left[\begin{array}{ccc|c} 1 & 3 & 2 & 2 \\ 0 & 1 & 3 & -5 \\ 0 & 0 & 1 & -2 \end{array}\right] \xrightarrow{R2X-3+R1} \left[\begin{array}{ccc|c} 1 & 0 & -7 & 17 \\ 0 & 1 & 3 & -5 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

$$\xrightarrow{R3X7+R1} \left[\begin{array}{ccc|c} 1 & 0 & 0 & 3 \\ 0 & 1 & 3 & -5 \\ 0 & 0 & 1 & -2 \end{array}\right] \xrightarrow{R3X-3+R2} \begin{array}{ccc} x & y & z \end{array} \left[\begin{array}{ccc|c} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

$$x = 3$$
$$y = 1$$
$$z = -2$$