Version 1: Quiz Two (103/104), Oct 2

**Problem 1:** [1 point] True/False: If the equation \( A\bar{x} = \bar{b} \) is consistent then \( \bar{b} \) is in the set spanned by the columns of \( A \).

A: False  B: True

**Problem 2:** [1 point] Suppose \( \bar{y} \) and \( \bar{z} \) are both solutions of \( A\bar{x} = \bar{b} \). True/False: All linear combinations of \( \bar{y} \) and \( \bar{z} \) also solve \( A\bar{x} = \bar{b} \).

A: False  B: True

**Problem 3:** [1 point] Let \( M = (\vec{v}_1 \ \vec{v}_2 \ \vec{v}_3) \) be a 2 \times 3 matrix with columns \( \vec{v}_1, \vec{v}_2, \vec{v}_3 \). Suppose \( \vec{v}_3 = \vec{v}_1 - 2\vec{v}_2 \). Under what condition, if any, can we be sure that the equation \( M\bar{x} = \bar{b} \) consistent?

A: Never consistent.  B: \( \bar{b} \in \text{span } (\vec{v}_1, \vec{v}_2) \).  C: \( \bar{b} = \begin{pmatrix} 1 \\ -2 \\ 0 \end{pmatrix} \).  D: \( \bar{b} = \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix} \).  E: Always consistent.

**Problem 4:** [1 point] Choose \( r \) and \( s \) so that the columns of \( A \) span \( \mathbb{R}^3 \). \( A = \begin{pmatrix} 2 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 \\ -1 & -2 & r & s \end{pmatrix} \)

A: \( r = -3, s = -3 \)  B: \( r = 0, s = -3 \)  C: \( r = -3, s = 0 \)  D: \( r = 2, s = -3 \)  E: Impossible

**Problem 5:** [1 point] Starting with \( A = \begin{pmatrix} 3 & 2 & -1 & 3 \\ 4 & 3 & -1 & 4 \\ -2 & -3 & -1 & -2 \end{pmatrix} \), elementary row operations are used to reach reduced row echelon form. Which is correct?

A: \( \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \)  B: \( \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \)  C: \( \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \)  D: \( \begin{pmatrix} 1 & 0 & -1 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix} \)  E: \( \begin{pmatrix} 1 & 0 & 0 & 1 \\ 1 & -1 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \)

**Problem 6:** [1 point] Let \( R \) be the reduced row echelon form of an invertible \( n \times n \) matrix \( A \). Then:

A: \( R \) is the identity matrix.  B: \( R \) has at least one row of all zeros.  C: We cannot tell without seeing \( A \).  D: \( R \) is \( A^{-1} \).  E: \( R \) is proportional to \( A^{-1} \).

**Problem 7:** [1 point] Suppose we want to graph the equations represented by the rows of the augmented matrix \( \begin{pmatrix} 1 & 0 & 3 & 2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 4 \end{pmatrix} \). What will they look like?

A: These equations represent two equations for the same plane.  B: These equations represent three equations for the same plane.  C: These equations represent two planes that have a line of points in common.  D: The intersection of these linear equations is represented by a plane in \( \mathbb{R}^3 \).  E: These equations cannot be represented geometrically.

**Problem 8:** [1 point] What is the solution to the system of equations represented with this augmented matrix \( \begin{pmatrix} 1 & 0 & 3 & 2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 4 \end{pmatrix} \)

A: \( x = 2; y = 3; z = 4 \)  B: \( x = -1; y = 1; z = 1 \)  C: There are an infinite number of solutions.  D: There is no solution.  E: We can’t tell without having the system of equations.