Problem 1. **(1 point)**

Determine whether the following system has no solution, an infinite number of solutions or a unique solution.

? 1. $\begin{cases} 3x - 7y = 7 \\ 6x + 6y = 2 \\ -21x - 31y = 0 \end{cases}$

? 2. $\begin{cases} -15x - 15y = 10 \\ -9x - 9y = 6 \\ -21x - 21y = 14 \end{cases}$

? 3. $\begin{cases} 3x - 7y = 7 \\ 6x + 6y = 2 \\ -21x - 31y = -1 \end{cases}$

Answer(s) submitted:

- NO SOLUTION
- INFINITE SOLUTIONS
- UNIQUE SOLUTION

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

Give a geometric description of the following systems of equations

? 1. $\begin{cases} x + 3y + 9z = 3 \\ -x - 4y - 13z = 1 \\ 4x + 12y + 40z = 7 \end{cases}$

? 2. $\begin{cases} 7x - 5y + z = 3 \\ 3x - y - 3z = 4 \\ -5x - y + 13z = -16 \end{cases}$

? 3. $\begin{cases} 6x - 15y - 6z = -6 \\ -10x + 25y + 10z = 10 \\ 12x - 30y - 12z = -12 \end{cases}$

? 4. $\begin{cases} 7x - 5y + z = 3 \\ 3x - y - 3z = 4 \\ -5x - y + 13z = -13 \end{cases}$

Answer(s) submitted:

- THREE PLANES INTERSECTING AT A POINT
- THREE PLANES WITH NO COMMON INTERSECTION
- THREE IDENTICAL PLANES
- THREE PLANES INTERSECTING IN A LINE

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

Determine whether the following matrices are in reduced echelon form, echelon form (that is, pivots need not be 1 and rows above pivots need not be reduced to zero), or not in echelon form.

1. $\begin{bmatrix} -10 & 0 & 1 \\ 0 & 10 & 0 \end{bmatrix}$
   - A. Echelon Form
   - B. Reduced Echelon Form
   - C. Not in Echelon Form

2. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
   - A. Echelon Form
   - B. Reduced Echelon Form
   - C. Not in Echelon Form

3. $\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$
   - A. Echelon Form
   - B. Reduced Echelon Form
   - C. Not in Echelon Form

4. $\begin{bmatrix} 1 & 0 & 0 & -8 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 5 \end{bmatrix}$
   - A. Echelon Form
   - B. Reduced Echelon Form
   - C. Not in Echelon Form

Answer(s) submitted:

- A
- B
- B
- C

submitted: (correct)
recorded: (correct)

Problem 4. **(1 point)**

The system

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

has the solution $x =$ ____, $y =$ ____, $z =$ ____.

Answer(s) submitted:

- -12
- 10
- -6

submitted: (correct)
recorded: (correct)

Problem 5. **(1 point)**

Solve the system:

$$\begin{cases} 4x + 5y = a \\ -3x - 4y = b \end{cases}$$

$x =$ _____
$y =$ _____

Answer(s) submitted:

- $4a+5b$
- $-3a-4b$

submitted: (correct)
recorded: (correct)

Problem 6. **(1 point)**

The solution set of the linear system

$$\begin{cases} w - 5x - 5y - 13z = -13 \\ -2w + 13x + 10y + 32z = 32 \end{cases}$$

may be written as $\vec{v}_1 + s\vec{v}_2 + t\vec{v}_3 : s,t \in \mathbb{R}$ for some vectors $\vec{v}_1$, $\vec{v}_2$, and $\vec{v}_3 \in \mathbb{R}^4$. Find $\vec{v}_1$, $\vec{v}_2$, and $\vec{v}_3$.

$\vec{v}_1 = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$; $\vec{v}_2 = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$; $\vec{v}_3 = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$;

Answer(s) submitted:

- $\begin{bmatrix} -3 \\ 2 \\ 0 \\ 0 \end{bmatrix}$; $\begin{bmatrix} 5 \\ 0 \\ 1 \\ 0 \end{bmatrix}$; $\begin{bmatrix} 3 \\ -2 \\ 0 \\ 1 \end{bmatrix}$

submitted: (correct)
recorded: (correct)

Problem 7. **(1 point)**

$$\begin{cases} x - 2y + 8z = 3 \\ -5x + 5y - 50z = -30 \\ -7x + 9y - 66z = k \end{cases}$$

In order for the system of equations above to be a consistent system, k must be equal to ____.

Answer(s) submitted:

- -36

submitted: (correct)
recorded: (correct)

Problem 8. **(1 point)**

Determine the value of k for which the system

$$\begin{cases} x + y + 4z = 0 \\ x + 2y - 3z = -2 \\ 3x + 8y + kz = -9 \end{cases}$$

has no solutions.
$k =$ _____

Answer(s) submitted:

- -23

submitted: (correct)
recorded: (correct)

Problem 9. **(1 point)**

Determine all values of h and k for which the system

$$\begin{cases} 9x + 8y = h \\ -4x + ky = -6 \end{cases}$$

has no solution.
$k =$ ____
$h \neq$ ____

Answer(s) submitted:

- $-\frac{32}{9}$
- $\frac{27}{2}$

submitted: (correct)
recorded: (correct)

Problem 10. **(1 point)**

Suppose that the following

$$\begin{cases} -9x + 6y = 15 \\ -21x + 14y = k \\ -15x + 10y = 25 \end{cases}$$

is a consistent system. Then $k =$ ____

Answer(s) submitted:

- 35

submitted: (correct)
recorded: (correct)

Problem 11. **(1 point)**

Let k, h be unknown constants and consider the linear system:

$$\begin{array}{rcrcl} 5x & - & 7y & = & h \\ -4x & + & ky & = & -9 \end{array}$$

This system has a unique solution whenever $k \neq$ _____.

If the given system does **not** have a unique solution, then it will be consistent for how many value(s) of h?

- A. no values
- B. a unique value
- C. infinitely many values

Answer(s) submitted:

- $\frac{28}{5}$
- B

submitted: (correct)
recorded: (correct)

Problem 12. **(1 point)**

Find the RREF of the matrix $A = \begin{bmatrix} 1 & -4 & -4 & -9 \\ 2 & -8 & -8 & -17 \\ -2 & 9 & 10 & 21 \end{bmatrix}$.

$\text{rref}(A) = \begin{bmatrix} \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \end{bmatrix}$

Answer(s) submitted:

- $\begin{bmatrix} 1 & 0 & 4 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

submitted: (correct)
recorded: (correct)