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1. (1 point)
Write the augmented matrix of the system

$$\begin{cases} 20x & +87z=-33 \\ 1x & -7y-87z=-8 \\ 60x+90y & =5 \end{cases}$$

$$\left[\begin{array}{ccc|c} \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \end{array}\right]$$

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2. (1 point) Convert the augmented matrix

$$\left[\begin{array}{cccc} 5 & 1 & 5 & -4 \\ 0 & 2 & -5 & 5 \end{array}\right]$$

to the equivalent linear system. Use **x1**, **x2**, and **x3** to enter the variables x_1, x_2, and x_3.

_____ = __
_____ = __

Solution: SOLUTION:

$$\begin{array}{rcrcrcr} 5x_1 & + & x_2 & + & 5x_3 & = & -4 \\ & & 2x_2 & - & 5x_3 & = & 5 \end{array}$$

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3. (1 point) Determine which of the points $(-6,3,-2)$, $(-4,-5,-4)$, and $(-4,6,-2)$ satisfy the linear system

$$\begin{array}{rcrcrcr} 5x_1 & + & 3x_2 & - & 4x_3 & = & -13 \\ 2x_1 & - & 2x_2 & + & 5x_3 & = & -28 \end{array}$$

Answer: _____

Solution: SOLUTION:

$5(-6)+2(3)-4(-2)=-13$ and $3(-6)-2(3)+5(-2)=-28$, so $(-6,3,-2)$ satisfies the linear system
$5(-4)+2(6)-4(-2)=6$ and $3(-4)-2(6)+5(-2)=-30$, so $(-4,6,-2)$ does not satisfy the linear system
$5(-4)+2(-5)-4(-4)=-19$ and $3(-4)-2(-5)+5(-4)=-18$, so $(-4,-5,-4)$ does not satisfy the linear system

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4. (1 point) Solve the system using elimination.

$$\begin{cases} -4x+2y+5z=-29 \\ 5x-2y+2z=-5 \\ -5x-5y+6z=-35 \end{cases}$$

$x =$ _____
$y =$ _____
$z =$ _____

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5. (1 point) Solve the system using any method

$$\begin{aligned} -x+y+z &= -7 \\ 4x-3y-z &= 18 \\ x+y+z &= -5 \end{aligned}$$

Your answer is
$x =$ _____
$y =$ _____
$z =$ _____

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6. (1 point)
Solve the system using matrices (row operations)

$$\begin{cases} 2x-5y+3z=-13 \\ x+2y-4z=19 \\ -4x-3y-4z=-6 \end{cases}$$

How many solutions are there to this system?

- A. None
- B. Exactly 1
- C. Exactly 2
- D. Exactly 3
- E. Infinitely many
- F. None of the above

If there is one solution, give its coordinates in the answer spaces below.

If there are infinitely many solutions, enter z in the answer blank for z, enter a formula for y in terms of z in the answer blank for y and enter a formula for x in terms of z in the answer blank for x.

If there are no solutions, leave the answer blanks for x, y and z empty.

$x =$ _____

$y =$ _____

$z =$ _____

7. (1 point)

The reduced row echelon form of a system of linear equations in x and y or in x, y and z is given. For each system, determine whether it has a unique solution (in this case, find the solution), infinitely many solutions, or no solutions.

1.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 2 \end{array}\right]$$

- A. Unique solution: $x = 1, y = 2, z = 2$
- B. No solutions
- C. Unique solution: $x = 1, y = 2, z = 0$
- D. Unique solution: $x = 1, y = 2$
- E. Infinitely many solutions
- F. None of the above

2.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

- A. Infinitely many solutions
- B. Unique solution: $x = -1, y = -1$
- C. Unique solution: $x = 0, y = 0, z = 0$
- D. Unique solution:$x = -1, y = -1$
- E. No solutions
- F. None of the above

3.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

- A. Unique solution: $x = 2, y = -2$
- B. Unique solution: $x = 0, y = 2, z = -2$
- C. Unique solution: $x = 0, y = 2$
- D. Infinitely many solutions
- E. No solutions
- F. None of the above

4.
$$\left[\begin{array}{cc|c} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{array}\right]$$

- A. Unique solution: $x = 1, y = 1, z = 0$
- B. Unique solution: $x = 0, y = 0, z = 0$
- C. No solutions
- D. Infinitely many solutions
- E. Unique solution: $x = 0, y = 0$
- F. None of the above

8. (1 point) Determine whether the following system has no solution, an infinite number of solutions or a unique solution.

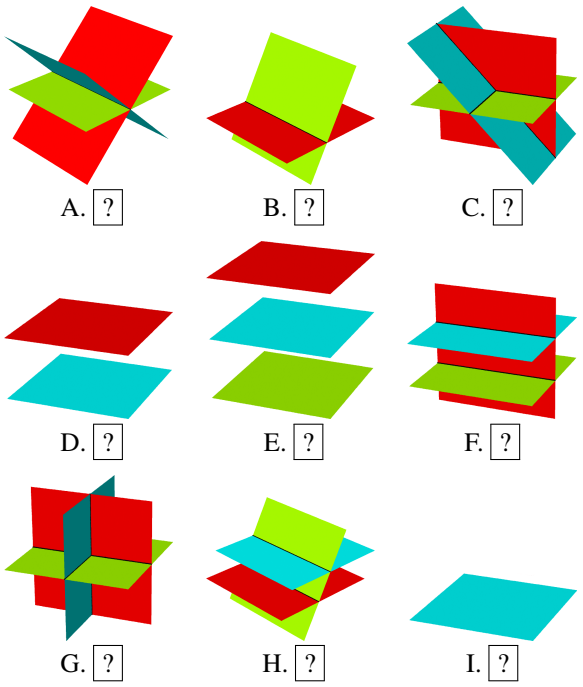
? 1.
$$\begin{cases} -10x + 10y - 6z = 10 \\ 20x - 20y + 12z = -20 \\ -30x + 30y - 18z = 30 \end{cases}$$

? 2.
$$\begin{cases} -4x - 16y - 61z = 6 \\ 4x + 17y + 63z = 10 \\ x + 4y + 15z = 0 \end{cases}$$

? 3.
$$\begin{cases} 3x + 3y - 3z = -5 \\ -3x + 5y + 5z = -3 \\ 9x + 25y - 5z = -28 \end{cases}$$

? 4.
$$\begin{cases} 3x + 3y - 3z = -5 \\ -3x + 5y + 5z = -3 \\ 9x + 25y - 5z = -31 \end{cases}$$

9. (1 point) Each graph below is the graph of a system of three linear equations in three unknowns. Determine which systems are consistent and inconsistent.



A. ? B. ? C. ?

D. ? E. ? F. ?

G. ? H. ? I. ?

(Click on a graph to enlarge it.)

10. (1 point) Consider a linear system whose augmented matrix is

$$\left[\begin{array}{ccc|c} 1 & 1 & 5 & -3 \\ 1 & 2 & -4 & 1 \\ 7 & 17 & k & 20 \end{array}\right]$$

For what value of k will the system have no solutions?

$k =$ _____

Solution:

SOLUTION: Performing several elementary row operations, we get that the given augmented matrix is row equivalent to:

$$\left[\begin{array}{ccc|c} 1 & 1 & 5 & -3 \\ 0 & 1 & -9 & 4 \\ 0 & 0 & k+55 & -20 \end{array}\right]$$

Therefore the system has no solutions if $k+55=0$, so $k=-55$.