

Solve the system of equations

SCORE: ____ / 12 PTS

$$3x - 6y - 8z = -15$$

$$2x - 6y + 4z = 22$$

$$-5x + 13y - 2z = -27$$

NOTES: You must use the pivot method shown in lecture, and you must state all elementary row operations performed.
You must produce a matrix in reduced row echelon form (RREF) (if the system has a solution)
or row echelon form (REF) (if the system has no solution).
You must check that your final answer is correct (if the system has a solution).

$$\begin{bmatrix} 3 & -6 & -8 & -15 \\ 2 & -6 & 4 & 22 \\ -5 & 13 & -2 & -27 \end{bmatrix} R_1 \leftrightarrow R_2$$

$$\begin{bmatrix} 2 & -6 & 4 & 22 \\ 3 & -6 & -8 & -15 \\ -5 & 13 & -2 & -27 \end{bmatrix} \frac{1}{2}R_1$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 3 & -6 & -8 & -15 \\ -5 & 13 & -2 & -27 \end{bmatrix} \begin{array}{l} R_2 + (-3)R_1 \\ R_3 + (5)R_1 \end{array}$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 0 & 3 & -14 & -48 \\ 0 & -2 & 8 & 28 \end{bmatrix} R_2 \leftrightarrow R_3$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 0 & -2 & 8 & 28 \\ 0 & 3 & -14 & -48 \end{bmatrix} -\frac{1}{2}R_2$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 0 & 1 & -4 & -14 \\ 0 & 3 & -14 & -48 \end{bmatrix} R_3 + (-3)R_2$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 0 & 1 & -4 & -14 \\ 0 & 0 & -2 & -6 \end{bmatrix} -\frac{1}{2}R_3$$

$$\begin{bmatrix} 1 & -3 & 2 & 11 \\ 0 & 1 & -4 & -14 \\ 0 & 0 & 1 & 3 \end{bmatrix} \begin{array}{l} R_1 + (-2)R_3 \\ R_2 + (4)R_3 \end{array}$$

$$\begin{bmatrix} 1 & -3 & 0 & 5 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 3 \end{bmatrix} R_1 + (3)R_2$$

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

$$(x, y, z) = (-1, -2, 3)$$

$$3(-1) - 6(-2) - 8(3) = -3 + 12 - 24 = -15$$

$$2(-1) - 6(-2) + 4(3) = -2 + 12 + 12 = 22$$

$$-5(-1) + 13(-2) - 2(3) = 5 - 26 - 6 = -27$$

Solve the following systems of equations

SCORE: ____ / 18 PTS

[a]
$$\begin{aligned} 3x + 5y - 9z &= 2 \\ 2x - 3y + 13z &= -5 \\ -x + 2y - 8z &= 3 \end{aligned}$$

[b]
$$\begin{aligned} 3x + 4y - 11z &= -1 \\ 2x + y - 4z &= 2 \\ -x - 2y + 5z &= -3 \end{aligned}$$

NOTES: You must use the pivot method shown in lecture, and you must state all elementary row operations performed.
You must produce a matrix in reduced row echelon form (RREF) (if the system has a solution)
or row echelon form (REF) (if the system has no solution).

$$\begin{aligned} &\begin{bmatrix} 3 & 5 & -9 & 2 \\ 2 & -3 & 13 & -5 \\ -1 & 2 & -8 & 3 \end{bmatrix} R_1 \leftrightarrow R_3 \\ &\begin{bmatrix} -1 & 2 & -8 & 3 \\ 2 & -3 & 13 & -5 \\ 3 & 5 & -9 & 2 \end{bmatrix} -R_1 \\ &\begin{bmatrix} 1 & -2 & 8 & -3 \\ 2 & -3 & 13 & -5 \\ 3 & 5 & -9 & 2 \end{bmatrix} \begin{array}{l} R_2 + (-2)R_1 \\ R_3 + (-3)R_1 \end{array} \\ &\begin{bmatrix} 1 & -2 & 8 & -3 \\ 0 & 1 & -3 & 1 \\ 0 & 11 & -33 & 11 \end{bmatrix} R_3 + (-11)R_2 \\ &\begin{bmatrix} 1 & -2 & 8 & -3 \\ 0 & 1 & -3 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} R_1 + (2)R_2 \\ &\begin{bmatrix} 1 & 0 & 2 & -1 \\ 0 & 1 & -3 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} x + 2z &= -1 & \rightarrow & x = -2z - 1 \\ y - 3z &= 1 & \rightarrow & y = 3z + 1 \end{aligned}$$

$$(x, y, z) = (-2z - 1, 3z + 1, z)$$

$$\begin{aligned} &\begin{bmatrix} 3 & 4 & -11 & -1 \\ 2 & 1 & -4 & 2 \\ -1 & -2 & 5 & -3 \end{bmatrix} R_1 \leftrightarrow R_3 \\ &\begin{bmatrix} -1 & -2 & 5 & -3 \\ 2 & 1 & -4 & 2 \\ 3 & 4 & -11 & -1 \end{bmatrix} -R_1 \\ &\begin{bmatrix} 1 & 2 & -5 & 3 \\ 2 & 1 & -4 & 2 \\ 3 & 4 & -11 & -1 \end{bmatrix} \begin{array}{l} R_2 + (-2)R_1 \\ R_3 + (-3)R_1 \end{array} \\ &\begin{bmatrix} 1 & 2 & -5 & 3 \\ 0 & -3 & 6 & -4 \\ 0 & -2 & 4 & -10 \end{bmatrix} R_2 \leftrightarrow R_3 \\ &\begin{bmatrix} 1 & 2 & -5 & 3 \\ 0 & -2 & 4 & -10 \\ 0 & -3 & 6 & -4 \end{bmatrix} -\frac{1}{2}R_2 \\ &\begin{bmatrix} 1 & 2 & -5 & 3 \\ 0 & 1 & -2 & 5 \\ 0 & -3 & 6 & -4 \end{bmatrix} R_3 + (3)R_2 \\ &\begin{bmatrix} 1 & 2 & -5 & 3 \\ 0 & 1 & -2 & 5 \\ 0 & 0 & 0 & 11 \end{bmatrix} \end{aligned}$$

NO SOLUTION