

DAILY MATH - DAY 3

PHANIE'S MOM (DG)

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13 NOVEMBER 2025

Linear Equations Practice Set



2
1
3 2
5 + 1 =

$$1. \begin{bmatrix} 2 & 3 \\ 4 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ 3 \end{bmatrix}$$
$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-10-12} \begin{bmatrix} -5 & -3 \\ -4 & 2 \end{bmatrix} \begin{bmatrix} 7 \\ 3 \end{bmatrix}$$
$$= -\frac{1}{22} \begin{bmatrix} -35-9 \\ -28+6 \end{bmatrix}$$
$$= -\frac{1}{22} \begin{bmatrix} -44 \\ -22 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}, //$$

$$2. \begin{bmatrix} 5 & -2 \\ -3 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -13 \\ 31 \end{bmatrix}$$
$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{35-6} \begin{bmatrix} 7 & 2 \\ 3 & 5 \end{bmatrix} \begin{bmatrix} -13 \\ 31 \end{bmatrix}$$
$$= \frac{1}{29} \begin{bmatrix} -91+62 \\ -39+155 \end{bmatrix}$$
$$= \begin{bmatrix} -29/29 \\ 116/29 \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \end{bmatrix}$$

$$3. \begin{bmatrix} 7 & 4 \\ 6 & -11 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 26 \\ -97 \end{bmatrix}$$
$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-77-24} \begin{bmatrix} -11 & -4 \\ -6 & 7 \end{bmatrix} \begin{bmatrix} 26 \\ -97 \end{bmatrix}$$

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$$= -\frac{1}{101} \begin{bmatrix} -286+388 \\ -156-679 \end{bmatrix}$$
$$= \begin{bmatrix} -102/101 \\ 835/101 \end{bmatrix}$$

$$4. \begin{bmatrix} 1 & 2 & -1 \\ 2 & 5 & 1 \\ 3 & -1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 14 \\ 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 5 & 1 & 14 \\ 3 & -1 & 2 & 9 \end{bmatrix} \rightarrow R_2 + R_1 \times (-2)$$
$$\downarrow \quad \quad \quad \rightarrow R_3 + R_1 \times (-3)$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 0 & 1 & 3 & 8 \\ 0 & -7 & 5 & 0 \end{bmatrix} \rightarrow R_2 \times 7 + R_3$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 0 & 1 & 3 & 8 \\ 0 & 0 & 26 & 56 \end{bmatrix}$$

$$26z = 56$$
$$z = 56/26 = 28/13$$

$$y + 3z = 8$$
$$y + 3(28/13) = 8$$

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Continuing number 4

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$$y = \frac{20}{13}$$

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

$$x + \frac{40}{13} - \frac{28}{13} = 3$$

$$x = \frac{27}{13}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 27 \\ 20 \\ 28 \end{bmatrix} \times \frac{1}{13}$$

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2
1
5 + 1 = 3 2

⑤ $\begin{bmatrix} 1 & -2 & 3 \\ 2 & 1 & 1 \\ -3 & 2 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7 \\ 4 \\ -10 \end{bmatrix}$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -10 \end{bmatrix} \rightarrow R_1 \times (-2) + R_2$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -10 \end{bmatrix} \rightarrow R_1 \times (3) + R_3$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 5 & -5 & -10 \\ 0 & -4 & 7 & 11 \end{bmatrix} \rightarrow R_2 : 5 \quad \begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & -4 & 7 & 11 \end{bmatrix} \rightarrow R_2 \times 4 + R_3$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & 0 & 3 & 3 \end{bmatrix} \xrightarrow{3z=3} \begin{array}{l} z=1 \\ y-z=-2 \\ y=-2+1=-1 \end{array} \quad \left| \begin{array}{l} x-2y+3z=7 \\ x+2+3=7 \\ x=2 \end{array} \right.$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$$

⑥ $2x - 3y = -4$ $x + z = 5$ $3x - y + 2z = 16$

$$\left| \begin{array}{l} \begin{bmatrix} 2 & -3 & 0 & -4 \\ 1 & 0 & 1 & 5 \\ 3 & -1 & 2 & 16 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \begin{bmatrix} 1 & 0 & 1 & 5 \\ 2 & -3 & 0 & -4 \\ 3 & -1 & 2 & 16 \end{bmatrix} \\ R_1 \times (-2) + R_2 \\ R_1 \times (-3) + R_3 \end{array} \right. \xrightarrow{R_2 \leftrightarrow R_3} \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -3 & -2 & -14 \\ 0 & -1 & -1 & 1 \end{bmatrix} \rightarrow R_2 \leftrightarrow R_3 \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -1 & -1 & 1 \\ 0 & -3 & -2 & -14 \end{bmatrix}$$

$$\xrightarrow{R_2 \times 3 + R_3} \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -1 & -1 & 1 \\ 0 & 0 & 1 & -17 \end{bmatrix} \quad \boxed{Z = -17} \quad \left| \begin{array}{l} x+z=5 \\ -y-z=1 \\ -y+17=1 \\ \boxed{Y=16} \end{array} \right. \quad \boxed{X=22}$$

⑦ $\begin{bmatrix} 2 & 3 & 1 & 1 \\ 3 & 3 & 1 & 2 \\ 2 & 4 & 1 & -2 \end{bmatrix} \leftrightarrow \begin{bmatrix} 1 & 3 & 2 & 1 \\ 1 & 3 & 3 & 2 \\ 1 & 4 & 2 & -2 \end{bmatrix} \rightarrow R_1 \times (-1) + R_2$
 $\quad C_1 \leftrightarrow C_3 \quad \begin{bmatrix} 2 & y & x \\ 1 & 3 & 2 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & -3 \end{bmatrix} \rightarrow Z+3Y+2X=1$
 $\quad \rightarrow X=1$
 $\quad \rightarrow Y=-3$
 $\quad Z = 1 - 2 + 9 = 8 //$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -3 \\ 8 \end{bmatrix}$$

⑧ $\begin{bmatrix} 1 & 1 & 1 & 6 \\ 1 & -1 & 1 & 2 \\ 1 & 2 & -1 & 2 \end{bmatrix} \rightarrow R_1 \times (-1) + R_2 \quad \begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & -2 & 0 & -4 \\ 0 & 1 & -2 & -4 \end{bmatrix}$
 $\rightarrow R_1 \times (-1) + R_3$

$$\begin{array}{l} -2y = -4 \\ \boxed{Y=2} \end{array} \quad \begin{array}{l} y-2z = -4 \\ 2-2z = -4 \\ -2z = -6 \\ \boxed{Z=3} \end{array} \quad \begin{array}{l} x+y+z = 6 \\ x+2+3 = 6 \\ x = 1 \end{array} \quad \left| \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \right.$$

⑨ $\begin{bmatrix} 1 & 1 & -1 & 4 \\ 2 & -1 & 3 & 9 \\ 3 & 2 & -2 & 1 \end{bmatrix} \rightarrow R_1 \times (-2) + R_2 \quad \begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & -3 & 5 & 1 \\ 0 & -1 & 1 & -11 \end{bmatrix} \rightarrow R_1 \times (-3) + R_3$
 $\rightarrow R_2 \leftrightarrow R_3$

$$\begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & -1 & 1 & -11 \\ 0 & -3 & 5 & 1 \end{bmatrix} \rightarrow R_2 \times (-3) + R_3 \quad \begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & 1 & 1 & -34 \\ 0 & 0 & 2 & 34 \end{bmatrix}$$

$$\begin{array}{l} 2z = 34 \\ \boxed{Z=17} \end{array} \quad \begin{array}{l} -y+z = -11 \\ -y = -11-17 \\ \boxed{Y=28} \end{array} \quad \begin{array}{l} x+y-z = 4 \\ x+28-17 = 4 \\ x = 4-11 = -7 \end{array} \quad \left| \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -7 \\ 28 \\ 17 \end{bmatrix} \right.$$

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1
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+ 1 =

$$10. \begin{bmatrix} 3 & 2 & 4 & 13 \\ 2 & 1 & 3 & 9 \\ 1 & 3 & 2 & 5 \end{bmatrix} \xrightarrow{R_3 \leftrightarrow R_1} \begin{bmatrix} 1 & 3 & 2 & 5 \\ 2 & 1 & 3 & 9 \\ 3 & 2 & 4 & 13 \end{bmatrix} \xrightarrow{R_1 \times -2 + R_2}$$

$$\begin{bmatrix} 1 & 3 & 2 & 5 \\ 0 & -5 & -1 & -1 \\ 0 & -7 & -2 & -2 \end{bmatrix} \xrightarrow{C_2 \leftrightarrow C_3} \begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & -2 & -7 & -2 \end{bmatrix} \xrightarrow{R_2 \times (-2) + R_3}$$

$$\begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & 0 & 3 & 0 \end{bmatrix} \xrightarrow{3y=0} \begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & 0 & 3 & 0 \end{bmatrix} \xrightarrow{y=0} \begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & 0 & 3 & 0 \end{bmatrix} \xrightarrow{-z - 5y = -1} \begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & 0 & 3 & 0 \end{bmatrix} \xrightarrow{z=1}$$

$$x + 2z + 3y = 5$$

$$x + 2 = 5$$

$$x = 3$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}$$

$$11. \begin{bmatrix} -1 & 5 & -2 & -5 \\ 2 & -1 & 3 & 20 \\ 3 & 2 & -4 & -1 \end{bmatrix} \xrightarrow{R_1 \times 2 + R_2} \begin{bmatrix} -1 & 5 & -2 & -5 \\ 0 & 9 & -1 & 10 \\ 0 & 17 & -10 & -16 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -2 & 5 & -5 \\ 0 & -1 & 9 & 10 \\ 0 & -10 & 17 & -16 \end{bmatrix} \xrightarrow{R_2 \times 10 + R_3} \begin{bmatrix} -1 & -2 & 5 & -5 \\ 0 & -1 & 9 & 10 \\ 0 & 0 & -73 & -116 \end{bmatrix}$$

$$\begin{bmatrix} -z + 9y = 10 \\ 9\left[\frac{116}{73}\right] - \frac{730}{73} = z \\ z = \frac{314}{73} \end{bmatrix}$$

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

$$x = \frac{317}{73}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{73} \begin{bmatrix} 317 \\ 116 \\ 314 \end{bmatrix}$$

$$12. \begin{cases} 4x + z = 7 \\ 2x - 3y = -10 \\ y + 2z = 8 \end{cases} \xrightarrow{\begin{array}{l} 4x + z = 7 \\ 4x - 6y = -20 \\ \hline 6y + z = 27 \end{array}} \begin{cases} 12y + 2z = 54 \\ y + 2z = 8 \end{cases} \xrightarrow{\begin{array}{l} 11y = 46 \\ y = 46/11 \end{array}}$$

$$46/11 + 2z = 88/11$$

$$2z = 88/11 - 46/11$$

$$z = 21/11$$

$$13. \begin{cases} 5x - 2y + z = 4 \\ 2x + 3y - 2z = 7 \\ 3x + y + z = 5 \end{cases} \rightarrow \begin{bmatrix} z & x & y \\ 1 & 5 & -2 & 4 \\ -2 & 2 & 3 & 7 \\ 1 & 3 & 1 & 5 \end{bmatrix} \xrightarrow{R_1 \times 2 + R_2} \begin{bmatrix} z & x & y \\ 1 & 5 & -2 & 4 \\ 0 & 12 & -1 & 15 \\ 1 & 3 & 1 & 5 \end{bmatrix} \xrightarrow{R_1 \times -1 + R_3}$$

$$\begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & 12 & -1 & 15 \\ 0 & -2 & 3 & 1 \end{bmatrix} \xrightarrow{R_3 \leftrightarrow R_2} \begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 12 & -1 & 15 \end{bmatrix} \xrightarrow{R_2 \times (6) + R_3}$$

$$\begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 0 & 17 & 21 \end{bmatrix} \xrightarrow{17y=21} \begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 0 & 17 & 21 \end{bmatrix} \xrightarrow{y = 21/17} \begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 0 & 17 & 21 \end{bmatrix} \xrightarrow{-2x + 3y = 1} \begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 0 & 17 & 21 \end{bmatrix} \xrightarrow{3\left(\frac{21}{17}\right) - \frac{17}{17} = 2x} \begin{bmatrix} x = \frac{23}{17} \end{bmatrix}$$

$$\begin{bmatrix} z + 5x - 2y = 4 \\ z + 5\left(\frac{23}{17}\right) - 2\left(\frac{21}{17}\right) = 4\left(\frac{17}{17}\right) \\ z = -\frac{5}{17} \end{bmatrix}$$

$$14. \begin{cases} x + 2y + 3z = 14 \\ x + 2y + z = 6 \\ x + y + 2z = 8 \end{cases} \rightarrow \begin{cases} x + 2y + 3z = 14 \\ x + 2y + z = 6 \\ x + y + 2z = 8 \end{cases} \xrightarrow{2z = 8} \begin{bmatrix} z = 4 \end{bmatrix}$$

$$\begin{bmatrix} x + 2y + 4 = 8^2 \\ x + y + 8 = 8 \end{bmatrix} \xrightarrow{y = 2} \begin{bmatrix} x + 2(2) + 3(4) = 14 \\ x + 4 + 12 = 14 \\ x = -2 \end{bmatrix}$$

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An illustration of a person from the waist down, wearing a dark grey pencil skirt and a green belt. To the left of the person are large, stylized numbers: a teal '2' at the top, an orange '1' below it, a yellow '5' further down, and an orange plus sign ('+') to the right of the '5'. To the right of the person are a pink '3', a teal '2', a light blue '1', and a yellow equals sign ('=') at the bottom right.

$$19. \begin{array}{l} 2x + 5y - 3z = -7 \\ 4x + 3y + 2z = 21 \\ -2x + y + 5z = 23 \end{array} \left| \begin{array}{c} \left[\begin{array}{cccc} 2 & 5 & -3 & -7 \\ 4 & 3 & 2 & 21 \\ -2 & 1 & 5 & 23 \end{array} \right] \rightarrow R_1 \times (-2) + R_2 \\ \rightarrow R_1 \times (1) + R_3 \end{array} \right.$$

$$\left[\begin{array}{cccc} 2 & 5 & -3 & -7 \\ 0 & -7 & 8 & 35 \\ 0 & 6 & 2 & 16 \end{array} \right] \xrightarrow{\text{Row operations}} \begin{array}{l} -7y + 8z = 35 \\ 3y + z = 8 \end{array} \quad | \cdot 1 \quad | \cdot 8$$

$$-7y + 8z = 35$$

$$24y + 8z = 64$$

$$\frac{-31y = -29}{y = \frac{29}{31}}$$

$$2 = \frac{161}{31}$$

$$2x + 5y - 3z = -1$$

$$2x + 5\left(\frac{29}{31}\right) - 3\left(\frac{161}{31}\right) = -7\left(\frac{31}{31}\right)$$

$$2x = \frac{121}{31} , \boxed{x = \frac{121}{62}}$$