

3.44

Problems

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$$\left[\begin{array}{cc|c} 1 & 2 & 11 \\ 0 & -3 & -12 \end{array} \right] \xrightarrow{-1R_1 + R_2} \left[\begin{array}{cc|c} 1 & 2 & 11 \\ 0 & -3 & -12 \end{array} \right] \xrightarrow{-\frac{1}{3}R_2} \rightarrow$$

$$\left[\begin{array}{cc|c} 1 & 2 & 11 \\ 0 & 1 & 4 \end{array} \right]$$

$$y = 4$$

$$\{(3, 4)\}$$

$$\begin{aligned} x + 2y &= 11 \\ x + 2(4) &= 11 \\ x + 8 &= 11 \\ x &= 11 - 8 \\ x &= 3 \end{aligned}$$

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$$\left[\begin{array}{cc|c} 3 & -5 & 7 \\ 1 & -1 & 1 \end{array} \right] \xrightarrow{R_1 \leftrightarrow R_2} \left[\begin{array}{cc|c} 1 & -1 & 1 \\ 3 & -5 & 7 \end{array} \right] \xrightarrow{-3R_1 + R_2} \rightarrow$$

$$\left[\begin{array}{cc|c} 1 & -1 & 1 \\ 0 & -2 & 4 \end{array} \right] \xrightarrow{-\frac{1}{2}R_2} \left[\begin{array}{cc|c} 1 & -1 & 1 \\ 0 & 1 & -2 \end{array} \right]$$

$$y = -2$$

$$\begin{aligned} x - y &= 1 \\ x - (-2) &= 1 \\ x + 2 &= 1 \\ x &= -1 \end{aligned}$$

$$\{(-1, -2)\}$$

To avoid Fractions

$$\begin{array}{c} \textcircled{20} \\ \left[\begin{array}{cc|c} 3 & -5 & 22 \\ 4 & -2 & 20 \end{array} \right] \xrightarrow{R_1 \leftrightarrow R_2} \left[\begin{array}{cc|c} 4 & -2 & 20 \\ 3 & -5 & 22 \end{array} \right] \end{array}$$

$$\xrightarrow{\frac{1}{4}R_1} \left[\begin{array}{cc|c} 1 & -\frac{1}{2} & 5 \\ 3 & -5 & 22 \end{array} \right] \xrightarrow{-3R_1 + R_2} \left[\begin{array}{cc|c} 1 & -\frac{1}{2} & 5 \\ 0 & -\frac{7}{2} & 7 \end{array} \right]$$

$$\frac{3}{2} - \frac{10}{2} = -\frac{7}{2}$$

$$\xrightarrow{-\frac{2}{7}R_2} \left[\begin{array}{cc|c} 1 & -\frac{1}{2} & 5 \\ 0 & 1 & -2 \end{array} \right]$$

$$\textcircled{y = -2}$$

$$x - \frac{1}{2}y = 5$$

$$x - \frac{1}{2}(-2) = 5$$

$$x + 1 = 5$$

$$\textcircled{x = 4}$$

$$\{(4, -2)\}$$

3.4
#22

$$\left[\begin{array}{cc|c} 6 & -8 & 6 \\ -3 & 4 & 12 \end{array} \right] \xrightarrow{\frac{1}{6}R_1} \left[\begin{array}{cc|c} 1 & -\frac{4}{3} & 1 \\ -3 & 4 & 12 \end{array} \right] \xrightarrow{3R_1 + R_2}$$

$$\left[\begin{array}{cc|c} 1 & -\frac{4}{3} & 1 \\ 0 & 0 & 15 \end{array} \right]$$

$$\frac{1}{3}\left(-\frac{4}{3}\right) = -4$$

No Solution
INCONSISTENT

3.4 22 continued

$$\left[\begin{array}{cc|c} -3 & 4 & 12 \\ 6 & -8 & 6 \end{array} \right] \xrightarrow{-\frac{1}{3}R_1} \left[\begin{array}{cc|c} 1 & -4/3 & -4 \\ 6 & -8 & 6 \end{array} \right] \xrightarrow{-6R_1+R_2}$$

$$\left[\begin{array}{cc|c} 1 & -4/3 & -4 \\ 0 & 0 & 30 \end{array} \right] : \text{No solutions}$$

INCONSISTENT

$$-6\left(-\frac{4}{3}\right) + (-8) = 18 + (-8) = 10 \neq 0$$

$$-6(-4) + 6 = 24 + 6 = 30$$

$$-\frac{1}{3} \cdot 12 = -\frac{12}{3} = -4$$

3.4

Problem

24

$$\left[\begin{array}{cc|c} 3 & -6 & 1 \\ 2 & -4 & \frac{2}{3} \end{array} \right] \xrightarrow{\frac{1}{3}R_1} \left[\begin{array}{cc|c} 1 & -2 & \frac{1}{3} \\ 2 & -4 & \frac{2}{3} \end{array} \right] \xrightarrow{-2R_1 + R_2}$$

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

Infinite no. of
Solutions.
DEPENDENT

$$-2(1) + 2 = 0$$

$$-2(-2) + (-4) = 4 + (-4) = 0$$

$$-2\left(\frac{1}{3}\right) + \frac{2}{3} = -\frac{2}{3} + \frac{2}{3} = 0$$