

Section 6.1

$$\textcircled{1} \quad \begin{array}{cc|c} x & y & \# \\ \hline 1 & 2 & 3 \\ 3 & 4 & 5 \end{array}$$

$$R_2 - 3R_1 \quad \begin{array}{cc|c} 1 & 2 & 3 \\ \hline 0 & -2 & -4 \end{array}$$

$$\frac{R_2}{-2} \quad \begin{array}{cc|c} 1 & 2 & 3 \\ \hline 0 & 1 & 2 \end{array}$$

$$R_1 - 2R_2 \quad \begin{array}{cc|c} 1 & 0 & -1 \\ \hline 0 & 1 & 2 \end{array}$$

$$1x + 0y = -1 \Rightarrow x = -1$$

$$0x + 1y = 2 \Rightarrow y = 2$$

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

Note: To get a 1 we divide a row by an appropriate number.

To get a 0 we do:

Current Row - # (Pivot Row)

(2)

$$\begin{array}{cc|c} x & y & \# \\ \hline 2 & 18 & -98 \\ 2 & 8 & -38 \end{array}$$

$$\frac{R_1}{2} \quad \begin{array}{cc|c} 1 & 9 & -49 \\ 2 & 8 & -38 \end{array}$$

$$R_2 - 2R_1 \quad \begin{array}{cc|c} 1 & 9 & -49 \\ 0 & -10 & 60 \end{array}$$

$$\frac{R_2}{-10} \quad \begin{array}{cc|c} 1 & 9 & -49 \\ 0 & 1 & -6 \end{array}$$

$$R_1 - 9R_2 \quad \begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & -6 \end{array}$$

$$1x + 0y = 5 \Rightarrow x = 5$$

$$0x + 1y = -6 \Rightarrow y = -6$$

$$(x, y) = (5, -6)$$

(3)

$$\begin{array}{cc|c} x & y & \# \\ \hline 2 & 6 & 34 \\ -3 & 3 & 33 \end{array}$$

$$\frac{R_1}{2} \quad \begin{array}{cc|c} 1 & 3 & 17 \\ -3 & 3 & 33 \end{array}$$

$$R_2 + 3R_1 \quad \begin{array}{cc|c} 1 & 3 & 17 \\ 0 & 12 & 84 \end{array}$$

$$\frac{R_2}{12} \quad \begin{array}{cc|c} 1 & 3 & 17 \\ 0 & 1 & 7 \end{array}$$

$$R_1 - 3R_2 \quad \begin{array}{cc|c} 1 & 0 & -4 \\ 0 & 1 & 7 \end{array}$$

$$1x + 0y = -4 \Rightarrow x = -4$$

$$0x + 1y = 7 \Rightarrow y = 7$$

$$(x, y) = (-4, 7)$$

(4)

$$\begin{array}{ccc|c} x & y & z & \# \\ \hline 1 & 1 & 4 & 11 \\ 4 & 1 & -2 & 8 \\ -3 & 0 & 2 & -5 \end{array}$$

$$\begin{array}{l} R_2 - 4R_1 \\ R_3 + 3R_1 \end{array} \begin{bmatrix} 1 & 1 & 4 & 11 \\ 0 & -3 & -18 & -36 \\ 0 & 3 & 14 & 28 \end{bmatrix}$$

$$\frac{R_2}{-3} \begin{bmatrix} 1 & 1 & 4 & 11 \\ 0 & 1 & 6 & 12 \\ 0 & 3 & 14 & 28 \end{bmatrix}$$

$$\begin{array}{l} R_1 - R_2 \\ R_3 - 3R_2 \end{array} \begin{bmatrix} 1 & 0 & -2 & -1 \\ 0 & 1 & 6 & 12 \\ 0 & 0 & -4 & -8 \end{bmatrix}$$

$$\frac{R_3}{-4} \begin{bmatrix} 1 & 0 & -2 & -1 \\ 0 & 1 & 6 & 12 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

$$\begin{array}{l} R_1 + 2R_3 \\ R_2 - 6R_3 \end{array} \begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

$$\begin{aligned} 1x + 0y + 0z &= 3 \Rightarrow x = 3 \\ y &= 0 \\ z &= 2 \end{aligned}$$

$$(x, y, z) = (3, 0, 2)$$

(5)

$$\begin{array}{ccc|c} x & y & z & \# \\ 4 & -4 & 4 & 20 \\ 1 & -2 & -2 & -24 \\ 2 & 1 & 3 & 25 \end{array}$$

$$R_1 \leftrightarrow R_2 \begin{array}{ccc|c} 1 & -2 & -2 & -24 \\ 4 & -4 & 4 & 20 \\ 2 & 1 & 3 & 25 \end{array}$$

$$\begin{array}{l} R_2 - 4R_1 \\ R_3 - 2R_1 \end{array} \begin{array}{ccc|c} 1 & -2 & -2 & -24 \\ 0 & 4 & 12 & 116 \\ 0 & 5 & 7 & 73 \end{array}$$

$$\frac{R_2}{4} \begin{array}{ccc|c} 1 & -2 & -2 & -24 \\ 0 & 1 & 3 & 29 \\ 0 & 5 & 7 & 73 \end{array}$$

$$\begin{array}{l} R_1 + 2R_2 \\ R_3 - 5R_2 \end{array} \begin{array}{ccc|c} 1 & 0 & 4 & 34 \\ 0 & 1 & 3 & 29 \\ 0 & 0 & -8 & -72 \end{array}$$

$$\frac{R_3}{-8} \begin{array}{ccc|c} 1 & 0 & 4 & 34 \\ 0 & 1 & 3 & 29 \\ 0 & 0 & 1 & 9 \end{array}$$

$$\begin{array}{l} R_1 - 4R_3 \\ R_2 - 3R_3 \end{array} \begin{array}{ccc|c} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 9 \end{array}$$

$$1x + 0y + 0z = -2 \Rightarrow \begin{array}{l} x = -2 \\ y = 2 \\ z = 9 \end{array}$$

$$(x, y, z) = (-2, 2, 9)$$

$$⑥ \quad \begin{array}{cccc} x & y & z & \# \\ \left[\begin{array}{ccc|c} -1 & 1 & 0 & -3 \\ 1 & 0 & 1 & -2 \\ 6 & -3 & 2 & 6 \end{array} \right] \end{array}$$

$$R_1 \leftrightarrow R_2 \quad \left[\begin{array}{ccc|c} 1 & 0 & 1 & -2 \\ -1 & 1 & 0 & -3 \\ 6 & -3 & 2 & 6 \end{array} \right]$$

$$\begin{array}{l} R_2 + R_1 \\ R_3 - 6R_1 \end{array} \quad \left[\begin{array}{ccc|c} 1 & 0 & 1 & -2 \\ 0 & 1 & 1 & -5 \\ 0 & -3 & -4 & 18 \end{array} \right]$$

$$R_3 + 3R_2 \quad \left[\begin{array}{ccc|c} 1 & 0 & 1 & -2 \\ 0 & 1 & 1 & -5 \\ 0 & 0 & -1 & 3 \end{array} \right]$$

$$\frac{R_3}{-1} \quad \left[\begin{array}{ccc|c} 1 & 0 & 1 & -2 \\ 0 & 1 & 1 & -5 \\ 0 & 0 & 1 & -3 \end{array} \right]$$

$$\begin{array}{l} R_1 - R_3 \\ R_2 - R_3 \end{array} \quad \left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & -3 \end{array} \right]$$

$$1x + 0y + 0z = 1 \Rightarrow \begin{array}{l} x = 1 \\ y = -2 \\ z = -3 \end{array}$$

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

⑦ Let $x = \#$ of surfboards produced this week.
Let $y = \#$ of skateboards " "

Hours : $5x + 3y = 80$

\$: $120x + 20y = 1000$