

Systems of 3 Variables Key

① $c = 3b - 7$
 $b = a - 6c - 1$
 $4a + 6c = -18$

$(-3, 2, -1)$

$$\begin{array}{rcl} c = 3(a - 6c - 1) - 7 & (-3a + 19c = -10) \cdot 4 & -1 = 3b - 7 \\ c = 3a - 18c - 3 - 7 & (4a + 6c = -18) \cdot 3 & +7 \quad +7 \\ c = 3a - 18c - 10 & -12a + 76c = -40 & \frac{6}{3} = \frac{3b}{3} \\ -3a + 19c = -10 & \underline{12a + 18c = -54} & b = 2 \\ & 94c = -94 & \\ & c = -1 & \end{array}$$

$$\begin{array}{r} 4a + 6(-1) = -18 \\ 4a - 6 = -18 \\ \quad +6 \quad +6 \\ 4a = -12 \\ a = -3 \end{array}$$

② $-6x - 4y + 6z = 18$
 $(x + 4y + z = -27) \cdot 6$
 $y - 4z = 2$

$(-1, -6, -2)$

$$\begin{array}{rcl} -6x - 4y + 6z = 18 & 20y + 12z = -144 & -6 - 4z = 2 \\ 6x + 24y + 6z = -162 & \underline{3y - 12z = 6} & -4z = 8 \\ \hline 20y + 12z = -144 & 23y = -138 & z = -2 \\ (y - 4z = 2) \cdot 3 & y = -6 & \end{array}$$

$$\begin{array}{r} x + 4(-6) + (-2) = -27 \\ x - 24 - 2 = -27 \\ x - 26 = -27 \\ x = -1 \end{array}$$

$$\begin{aligned} \textcircled{3} \quad & 2y = -2 \\ & -3x + 2y + 4z = 6 \\ & 4x + y = 15 \end{aligned}$$

$$\boxed{(4, -1, 5)}$$

$$\begin{array}{lcl} 2y = -2 & 4x - 1 = 15 & -3(4) + 2(-1) + 4z = 6 \\ y = -1 & 4x = 16 & -12 - 2 + 4z = 6 \\ & x = 4 & -14 + 4z = 6 \\ & & 4z = 20 \\ & & z = 5 \end{array}$$

$$\begin{aligned} \textcircled{4} \quad & 4r - 4s + t = 8 \\ & 2r - s = 0 \\ & -4s = 8 \end{aligned}$$

$$\boxed{(-1, -2, 4)}$$

$$\begin{array}{lcl} s = -2 & 2r + 2 = 0 & 4(-1) - 4(-2) + t = 8 \\ & 2r = -2 & -4 + 8 + t = 8 \\ & r = -1 & 4 + t = 8 \\ & & t = 4 \end{array}$$

$$\begin{aligned} \textcircled{5} \quad & s = 2r + 5t + 13 & (-2r + s + 5t = 13) \cdot 3 \\ & t = 4r + 16 & -4r + t = 16 \\ & 3r + 3s - 6t = 3 & 3r + 3s - 6t = 3 \end{aligned}$$

$$\boxed{(-4, 5, 0)}$$

$$\begin{array}{lcl} 6r - 3s - 15t = -39 & (-4r + t = 16) \cdot 21 & t = 4(-4) + 16 \\ 3r + 3s - 6t = 3 & 9r - 21t = -36 & t = -16 + 16 \\ 9r - 21t = -36 & -84r + 21t = 336 & t = 0 \\ & -75r = 300 & \\ & r = -4 & \end{array}$$

$$\begin{aligned} s &= 2(-4) + 5(0) + 13 \\ s &= -8 + 13 \\ s &= 5 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & 2x - 5y - 2z = 3 \\ & -x + 4y - 2z = 0 \\ & 3x - y + 2z = 11 \end{aligned}$$

$$\boxed{(4, 1, 0)}$$

$$-x + 4y - 2z = 0$$

$$3x - y + 2z = 11$$

$$(2x + 3y = 11) \cdot 2$$

$$2(4) + 3y = 11$$

$$8 + 3y = 11$$

$$3y = 3$$

$$y = 1$$

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

$$3x - y + 2z = 11$$

$$5x - 6y = 14$$

$$4x + 6y = 22$$

$$9x = 36$$

$$x = 4$$

$$2(4) - 5 - 2z = 3$$

$$8 - 5 - 2z = 3$$

$$3 - 2z = 3$$

$$-2z = 0$$

$$z = 0$$

$$\textcircled{7} \quad (a + 6b + c = 28) \cdot 2$$

$$-4a - 4b - 3c = -10) \cdot 3$$

$$a = 2c - 8 \quad a - 2c = -8$$

$$\boxed{(-4, 5, 2)}$$

$$2a + 12b + 2c = 56$$

$$-12a - 12b - 9c = -30$$

$$-10a - 7c = 26$$

$$(a - 2c = -8) \cdot 10$$

$$-10a - 7c = 26$$

$$10a - 20c = -80$$

$$-27c = -54$$

$$c = 2$$

$$a = 2(2) - 8$$

$$= 4 - 8$$

$$a = -4$$

$$-4 + 6b + 2 = 28$$

$$6b - 2 = 28$$

$$6b = 30$$

$$b = 5$$

$$\textcircled{8} \quad -2a + 5b + c = -8$$

$$(-3b - c = 6) - 4$$

$$4b - 4c = -24$$

$$\boxed{(-2, -3, 3)}$$

$$12b + 4c = -24$$

$$4b - 4c = -24$$

$$16b = -48$$

$$b = -3$$

$$-3(-3) - c = 6$$

$$9 - c = 6$$

$$-c = -3$$

$$c = 3$$

$$-2a + 5(-3) + 3 = -8$$

$$-2a - 15 + 3 = -8$$

$$-2a - 12 = -8$$

$$-2a = 4$$

$$a = -2$$

$$\textcircled{9} \quad 5x - 3z = 17$$

$$(x + 5y - 5z = 14) - 5$$

$$-4y - 3z = 15$$

$$\boxed{(4, 3, 1)}$$

$$5x - 3z = 17$$

$$-5x - 25y + 25z = -70$$

$$-4(-25y + 22z = -53)$$

$$25(-4y - 3z = 15)$$

$$100y - 88z = 212$$

$$-100y - 75z = -375$$

$$-163z = -163$$

$$z = 1$$

$$5x - 3(1) = 17$$

$$5x - 3 = 17$$

$$5x = 20$$

$$x = 4$$

$$-4y - 3(1) = 15$$

$$-4y - 3 = 15$$

$$-4y = 12$$

$$y = -3$$

$$\textcircled{10} \quad 2a - 5b - c = 17$$

$$(a - 3c = -9) - 5$$

$$5a - 2c = -19$$

$$\boxed{(-3, -5, 2)}$$

$$-5a + 15c = 45$$

$$5a - 2c = -19$$

$$13c = 26$$

$$c = 2$$

$$5a - 2(2) = -19$$

$$5a - 4 = -19$$

$$5a = -15$$

$$a = -3$$

$$2(-3) - 5b - 2 = 17$$

$$-6 - 5b - 2 = 17$$

$$-8 - 5b = 17$$

$$-5b = 25$$

$$b = -5$$