

M4+1 12/4 Answer Key - Section 9.3 day 3 - Dependent Systems

P. 658
#18)

$$\left[\begin{array}{ccc|c} x-y+2z=2 & x-y+2z=2 & & \\ 3x+y+5z=8 & -3R_1+R_2 & & 4y-z=2 \\ 2x-y-2z=-7 & -2R_1+R_3 & & y-6z=-11 \end{array} \right] \begin{array}{l} \\ \\ -R_2+4R_3 \end{array}$$

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

$$4y-z=2 \quad 4y-2=2 \quad 4y=4 \quad \underline{y=1}$$

$$-23z=-46 \quad \underline{z=2}$$

$$(-1, 1, 2) \quad x=-1, y=1, z=2$$

#22)

$$\left[\begin{array}{ccc|c} 2y+z=3 & x-3y & =-2 & \\ 5x+4y+3z=-1 & 5x+4y+3z=-1 & & \\ x-3y & =-2 & & \end{array} \right] \begin{array}{l} \\ -5R_1+R_2 \\ \\ \end{array}$$

$$\left[\begin{array}{ccc|c} x-3y & =-2 & & \\ 14y+3z=9 & 14y+3z=9 & & \\ 2y+z=3 & -3R_3+R_2 & 13y & / = 0 \end{array} \right] \begin{array}{l} \\ \\ \rightarrow \\ \end{array} \begin{array}{l} x=-2 \\ z=3 \\ y=0 \end{array}$$

$$x=-2, y=0, z=3 \quad (-2, 0, 3)$$

#24)

$$\left[\begin{array}{ccc|c} -x+2y+5z=4 & -x+2y+5z=4 & & \\ x & -2z=0 & R_1+R_2 & \\ 4x-2y-11z=2 & 4x-2y-11z=2 & 4R_1+R_3 & \end{array} \right] \begin{array}{l} \\ \\ -3R_2+R_3 \end{array}$$

$$-x+2y+5z=4$$

$$2y+3z=4$$

$$0y+0z=6$$

$$0=6 = \text{False} = \underline{\text{No Solutions}} \\ = \underline{\text{Inconsistent}}$$

$$\#26) \begin{array}{l} x - 2y - 3z = 5 \\ 2x + y - z = 5 \\ 4x - 3y - 9z = 5 \end{array} \left[\begin{array}{l} -2R_1 + R_2 \\ -4R_1 + R_3 \end{array} \right] \begin{array}{l} x - 2y - 3z = 5 \\ / +5y + 5z = -5 \\ / +5y + 5z = -15 \end{array} \left[\begin{array}{l} -R_2 + R_3 \\ -R_3 + R_2 \end{array} \right]$$

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

$$5y + 5z = -5$$

$$0y + 0z = -10 \rightarrow 0 = -10 \text{ False} = \text{no solutions} \\ = \text{inconsistent}$$

$$\#30) \begin{array}{l} 2x + 4y - z = 3 \\ x + 2y + 4z = 6 \\ x + 2y - 2z = 0 \end{array} \left[\begin{array}{l} -2R_2 + R_1 \\ -2R_3 + R_1 \end{array} \right] \begin{array}{l} 2x + 4y - z = 3 \\ / -9z = -9 \\ / 3z = 3 \end{array} \left[\begin{array}{l} -2R_3 + R_2 \\ +3R_3 + R_2 \end{array} \right]$$

$$2x + 4y - z = 3 \rightarrow 2x + 4y - z = 3$$

$$-9z = -9 \rightarrow z = 1$$

$$0 = 0 \rightarrow 0 = 0$$

y dropped out so y will be represented with \underline{t}

$$\text{Get } x \text{ by itself } 2x + 4y - z = 3$$

$$2x = 3 + z - 4y \quad (\text{Since } z=1)$$

$$2x = 3 + 1 - 4t$$

$$\frac{2x}{2} = \frac{4 - 4t}{2} \quad x = 2 - 2t$$

$$\text{Solution } x = 2 - 2t, y = t, z = 1$$

$$(2 - 2t, t, 1)$$