

Math 1214 Answer Key - Day 2 Equations with Several Variables
 Section 9.3. p 658

#15)
$$\begin{array}{l} X + Y + Z = 4 \\ X + 3Y + 3Z = 10 \\ 2X + Y - Z = 3 \end{array} \left[\begin{array}{l} -R_1 + R_2 \rightarrow \\ -2R_1 + R_3 \rightarrow \end{array} \right] \begin{array}{l} X + Y + Z = 4 \\ 2Y + 2Z = 6 \\ -Y - 3Z = -5 \end{array} \left[\begin{array}{l} R_1 + 2R_3 \rightarrow \end{array} \right]$$

$$\begin{array}{l} X + Y + Z = 4 \\ 2Y + 2Z = 6 \\ -Y - 3Z = -5 \end{array} \begin{array}{l} X + 2 + 1 = 4 \\ 2Y + 2(1) = 6 \\ -Y - 3 = -5 \end{array} \begin{array}{l} X + 3 = 4 \\ 2Y + 2 = 6 \\ Y = 2 \end{array} \begin{array}{l} X = 1 \\ Y = 2 \\ Z = 1 \end{array}$$

$(1, 2, 1)$

#17)
$$\begin{array}{l} X - Y - 6Z = 4 \\ 2X + 3Y - 2Z = 8 \end{array} \left[\begin{array}{l} -2R_1 + R_2 \\ -2R_1 + R_3 \end{array} \right] \begin{array}{l} X - Y - 6Z = 4 \\ -Y + 2Z = 2 \\ -Y + 2Z = 2 \end{array} \left[\begin{array}{l} 3R_2 + R_3 \end{array} \right]$$

$$\begin{array}{l} X - Y - 6Z = 1 \\ -Y + 2Z = 2 \\ +12Z = 12 \end{array} \begin{array}{l} X - Y(1) = 1 \\ -Y + 2(1) = 2 \\ Z = 1 \end{array} \begin{array}{l} X - Y = 5 \\ -Y = 0 \\ Y = 0 \end{array}$$

$(5, 0, 1)$

$$\begin{array}{l} \#19) \quad 2x + 4y - z = 2 \quad x + 2y - 3z = -4 \quad x + 2y - 3z = -4 \\ \quad \quad x + 2y - 3z = -4 \quad 2x + 4y - z = 2 \quad -2R_1 + R_2 \quad / \quad 5z = 10 \\ \quad \quad 3x - y + z = 1 \quad 3x - y + z = 1 \quad -3R_1 + R_3 \quad / \quad -7y + 10z = 13 \end{array}$$

$$\begin{array}{l} x + 2y - 3z = -4 \quad x + 2(1) - 3(2) = -4 \quad x + 2 - 6 = -4 \quad x = 0 \\ -7y + 10z = 13 \quad -7y + 20 = 13 \quad -7y = -7 \quad y = 1 \\ 5z = 10 \quad \uparrow \quad z = 2 \end{array}$$

$$x = 0, y = 1, z = 2 \quad (0, 1, 2)$$

$$\begin{array}{l} \#25) \quad 2x + 3y - z = 1 \quad x + 2y = 3 \quad x + 2y = 3 \\ \quad \quad x + 2y = 3 \quad x + 3y + z = 4 \quad -R_1 + R_2 \quad / \quad +y + z = 1 \\ \quad \quad x + 3y + z = 4 \quad 2x + 3y - z = 1 \quad -2R_1 + R_3 \quad / \quad -y - z = -5 \end{array}$$

$$\begin{array}{l} x + 2y = 3 \quad x + 2y = 3 \\ y + z = 1 \quad y + z = 1 \\ -y - z = -5 \quad R_2 + R_3 \quad / \quad 0 = -4 \quad \text{False} = \underline{\text{No Solutions}} \end{array}$$

False = inconsistent

$$\begin{array}{l} \#31) \quad x + z + 2w = 6 \quad x + z + 2w = 6 \\ \quad \quad y - 2z = -3 \quad y - 2z = -3 \\ \quad \quad x + 2y - z = -2 \quad -R_1 + R_3 \quad / \quad +2y - 2z - 2w = -8 \quad -2R_2 + R_3 \\ \quad \quad 2x + y + 3z - 2w = 0 \quad -2R_1 + R_4 \quad / \quad +y + z - 6w = -12 \quad -R_2 + R_4 \end{array}$$

$$\begin{array}{l} x + z + 2w = 6 \quad x + z + 2w = 6 \\ y - 2z = -3 \quad y - 2z = -3 \\ / \quad 2z - 2w = -2 \quad 2z - 2w = -2 \\ / \quad 3z - 6w = -9 \quad -3R_3 + 2R_4 \quad / \quad -6w = -12 \end{array}$$

$$\begin{array}{l} \left. \begin{array}{l} x = 1 \\ y = -1 \\ z = 1 \end{array} \right\} w = 2 \end{array}$$

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