

LINEAR EQUATION IN TWO UNKNOWNNS

Form 2 Regular Course
Vol 5

Part 1 - Method of Substitution

$$(g) \begin{cases} 2x + 3y = 15 & \dots\dots (1) \\ 3y - 2x = -9 & \dots\dots (2) \end{cases}$$

$$\text{By(1), } x = \frac{15-3y}{2}$$

$$\text{By(2), } 3y - 2\left(\frac{15-3y}{2}\right) = -9$$

$$3y - 15 + 3y = -9$$

$$6y = 6$$

$$y = 1$$

$$\text{By(1), } x = \frac{15-3y}{2}$$

$$\therefore x = 6, y = 1$$

$$(h) \begin{cases} 10x - 7y - 13 = 0 & \dots\dots (1) \\ 5x + 2y + 10 = 0 & \dots\dots (2) \end{cases}$$

$$\text{By(2), } y = \frac{-10-5x}{2}$$

$$\text{By(1), } 10x - 7\left(\frac{-10-5x}{2}\right) = 13$$

$$10x + \frac{70}{2} + \frac{35}{2}x = 13$$

$$x = -\frac{4}{5}$$

$$\text{By(2), } y = \frac{-10-5x}{2}$$

$$y = -3$$

$$\therefore x = -\frac{4}{5}, \quad y = -3$$

$$(i) \begin{cases} 3x + 2y = 18 & \dots\dots(1) \\ 6y + 5x = 34 & \dots\dots(2) \end{cases}$$

$$\text{By(1), } y = \frac{18-3x}{2}$$

$$\text{By(2), } 6\left(\frac{18-3x}{2}\right) + 5x = 34$$

$$54 - 9x + 5x = 34$$

$$20 = 4x$$

$$x = 5$$

$$\text{By(2), } 6y + 5x = 34$$

$$6y = 9$$

$$y = \frac{3}{2}$$

$$\therefore x = 5, y = \frac{3}{2}$$

$$(j) \begin{cases} 8x - 6y - 1 = 0 & \dots\dots(1) \\ 6x - 7y + 3 = 0 & \dots\dots(2) \end{cases}$$

$$\text{By(2), } y = \frac{6x+3}{7}$$

$$\text{By(1), } 8x - 6\left(\frac{6x+3}{7}\right) = 1$$

$$8x - \frac{36}{7}x - \frac{18}{7} = 1$$

$$x = \frac{5}{4}$$

$$\text{By(2), } y = \frac{6x+3}{7}$$

$$= \frac{3}{2}$$

$$\therefore x = \frac{5}{4}, y = \frac{3}{2}$$

Part 2 - Method of elimination

$$(g) \begin{cases} 6x + 25y = 31 & \dots\dots (1) \\ 4x + 15y = 19 & \dots\dots (2) \end{cases}$$

$$(1) \times 2 - (2) \times 3$$

$$50y - 45y = 62 - 57$$

$$y = 1$$

$$\text{By(1), } 6x + 25y = 31$$

$$6x = 6$$

$$x = 1$$

$$\therefore x = 1, y = 1$$

$$(h) \begin{cases} 6x - 5y - 7 = 0 & \dots\dots (1) \\ 2x - 5y + 9 = 0 & \dots\dots (2) \end{cases}$$

$$(1) - (2)$$

$$6x - 2x - 7 - 9 = 0$$

$$4x = 16$$

$$x = 4$$

$$\text{By(2), } 2x - 5y + 9 = 0$$

$$-5y = -17$$

$$y = \frac{17}{5}$$

$$\therefore x = 4, y = \frac{17}{5}$$

$$(i) \begin{cases} 4x - 3y = -3 & \dots\dots (1) \\ 3x - 2y = 19 & \dots\dots (2) \end{cases}$$

$$(1) \times 3 - (2) \times 4$$

$$-9y + 8y = -9 - 76$$

$$-y = -85$$

$$y = 85$$

$$\text{By(2), } 3x - 2y = 19$$

$$3x = 189$$

$$x = 63$$

$$\therefore x = 63, y = 85$$

$$(j) \begin{cases} x + y - 4 = 0 & \dots\dots(1) \\ x - y - 10 = 0 & \dots\dots(2) \end{cases}$$

$$(1) - (2)$$

$$y + y - 4 + 10 = 0$$

$$2y = -6$$

$$y = -3$$

$$\text{By(1), } x + y - 4 = 0$$

$$x = 7$$

$$\therefore x = 7, y = -3$$

Part 3 - Advanced problem

$$1. (a) \begin{cases} 2(x + 1) - 3(y - 1) = 0 \\ 7(x - 2) = 5(y - 3) \end{cases}$$

$$\begin{cases} 2x + 2 - 3y + 3 = 0 & \dots\dots(1) \\ 7x - 14 = 5y - 15 & \dots\dots(2) \end{cases}$$

$$\text{By(1), } x = \frac{3y-5}{2}$$

$$\text{By(2), } 7\left(\frac{3y-5}{2}\right) - 14 = 5y - 15$$

$$\frac{21}{2}y - \frac{35}{2} - 14 = 5y - 15$$

$$y = 3$$

$$\text{By(1), } x = \frac{3y-5}{2}$$

$$x = 2$$

$$\therefore x = 2, y = 3$$

$$(b) \begin{cases} 6x + 18y + 3x - 30 = 1 & \dots\dots (1) \\ 5x - 5y + y + 3 & \dots\dots (2) \end{cases}$$

$$\text{By(2), } x = \frac{4y-3}{5}$$

$$\text{By(1), } 9\left(\frac{4y-3}{5}\right) + 18y = 31$$

$$\frac{36}{5}y - \frac{27}{5} + 18y = 31$$

$$y = \frac{13}{9}$$

$$\text{By(2), } x = \frac{4y-3}{5}$$

$$x = \frac{5}{9}$$

$$\therefore x = \frac{5}{9}, y = \frac{13}{9}$$

$$(c) \begin{cases} 3e + 3f = 7e - 7f & \dots\dots (1) \\ 5e - 5f - e + f = 32 & \dots\dots (2) \end{cases}$$

$$\text{By(1), } 10f = 4e$$

$$e = \frac{5}{2}f$$

$$\text{By(2), } 4\left(\frac{5}{2}f\right) + 6f = 32$$

$$16f = 32$$

$$f = 2$$

$$\text{By(1), } e = \frac{5}{2}f$$

$$e = 5$$

$$\therefore e = 5, f = 2$$