

$$7(i) \quad \begin{aligned} px + qy &= p - q \dots (i) \\ qx - py &= p + q \dots (ii) \end{aligned}$$

$$(i) \times p + (ii) \times q$$

$$\begin{aligned} p^2x + pqy &= p^2 - pq \\ q^2x - pqy &= pq + q^2 \end{aligned}$$

$$(p^2 + q^2)x = p^2 + q^2$$

$$\Rightarrow x = \frac{p^2 + q^2}{p^2 + q^2}$$

$$\Rightarrow x = 1$$

Sub (i)

$$p \times 1 + qy = p - q$$

$$\Rightarrow qy = p - q - p$$

$$\Rightarrow y = \frac{-q}{q}$$

$$= -1$$

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

Sub (ii)

$$x = \frac{a}{b} \times b$$

$$\Rightarrow x = a$$

$$\therefore x = a, y = b$$

$$7(ii) \quad \begin{aligned} ax + by &= c \\ bx + ay &= 1 + c \end{aligned}$$

$$\begin{array}{ccc} 2 & 3 & 1 & 2 \\ b & c & a & b \\ a & 1+c & b & a \end{array}$$

$$\frac{x}{b+bc-ac} = \frac{y}{bc-a-ac} = \frac{-1}{a^2-b^2}$$

$$x = \frac{-1(b+bc-ac)}{a^2-b^2}$$

$$= \frac{ac-bc-b}{a^2-b^2}$$

$$y = \frac{-1(bc-a-ac)}{a^2-b^2}$$

$$= \frac{a+ac-bc}{a^2-b^2}$$

$$7(iii) \quad \frac{x}{a} - \frac{y}{b} = 0 \dots (i)$$

$$\Rightarrow \frac{x}{a} = \frac{y}{b}$$

$$\Rightarrow x = \frac{a}{b}y \dots (ii)$$

$$ax + by = a^2 + b^2 \dots (iii)$$

From (ii), (iii)

$$a\left(\frac{a}{b}y\right) + by = a^2 + b^2$$

$$\Rightarrow \frac{a^2}{b}y + by = a^2 + b^2$$

$$\Rightarrow \left(\frac{a^2+b^2}{b}\right)y = (a^2+b^2)$$

$$\Rightarrow y = b$$