1) $x + y = 5$

$2x + 2y = 10$

$x = 5 - y$

$2(5 - y) + 2y = 10$

$10 - 2y + 2y = 10$

No solution

$7x - 15y = 2 \quad -(1)$

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

x - form in Eq (2)

$x + 2y = 3$

$x = 3 - 2y$

Putting $x = 3 - 2y$ in Eq (1)

$7x - 15y = 2$

$7(3 - 2y) - 15y = 2$

$21 - 14y - 15y = 2$

$-29y = 2 - 21$

$+29y = +19$

$y = \frac{19}{29}$

Putting $y = \frac{19}{29}$ in x - form

$x = 3 - 2\left(\frac{19}{29}\right)$

$x = \frac{3}{1} - \frac{38}{29}$

$\times 29 \quad \times 1$

$x = \frac{87 - 38}{29}$

$x = \frac{49}{29}$

$\left(\frac{49}{29}, \frac{19}{29}\right)$

$\therefore -y = 4 \quad -(2)$

$4x + 3y = 25 \quad -(2)$

$3x + 4y = 24 \quad -(1)$

Step 1 : $3x + 4y = 24$

$3x = 24 - 4y$

$x = \frac{24 - 4y}{3}$

x-form

Step :2 Putting ~~equation~~ (x) in equation (2)

$4x + 3y = 25$

$4\left(\frac{24 - 4y}{3}\right) + 3y = 25$

$4(24 - 4y) + 3y = 25 \times 3$

$4(24 - 4y) + 3y = 75$

$96 - 4y + 3y = 75$

$96 - 7y = 75$

$96 - 75 = 7y$

$21 = 7y$

$y = \frac{21}{7} \; 3$

Step :- Putting $y = 3$ in x-form

$x = \frac{24 - 4(3)}{3}$

$x = \frac{24 - 12}{3}$

$x = \frac{12}{3} \; 4$

Ans = (4, 3)

96
75
21

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5 $\frac{3x}{\times 2 \times 3} - \frac{5}{\times 3 \times 2} y = \frac{-2}{\times 6}$

$\frac{x}{\times 2 \times 3} + \frac{y}{\times 3 \times 2} = \frac{13}{\times 1 \times 6}$

$9x - 10y = -12 \quad -(1)$

$2x + 3y = 13 \quad -(2)$

x - form in Eq (2)

$2x + 3y = 13$

$2x = 13 - 3y$

$x = \frac{13 - 3y}{2}$

Putting x - form in Eq (1)

$9x - 10y = -12$

$9\left(\frac{13 - 3y}{2}\right) - 10y = -12$

$\frac{117 - 27y}{2} - 10y = -12$

$117 - 27y - 10y = -12 \times 2$

$117 - 37y = -24$

$-37y = -24 - 117$

$-37y = -141$

$y = \frac{141}{37}$

$y = 3$

Putting $y = 3$ in x - form

$x = \frac{13 - 3(3)}{2}$

$x = \frac{4}{2}$

$x = 2$

$(2, 3)$

117
24
141

Cross - multiplication

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1 $8x + 5y = 9$
$3x + 2y = 4$

$8x + 5y - 9 = 0$
$3x + 2y - 4 = 0$

x	y	1
5	-9	8
2	-4	3
		5
		2

$$\frac{x}{5(-4)-2(-9)} \qquad \frac{y}{-9(3)-(-4)(8)} \qquad \frac{1}{8(3)-3(5)}$$

$$\frac{x}{-20+18} \qquad \frac{y}{-27+32} \qquad \frac{1}{16-15}$$

$$\frac{x}{-2} \qquad \frac{y}{5} \qquad \frac{1}{1}$$

Now $\frac{x}{-2} = \frac{1}{1}$ $\qquad \frac{y}{5} = \frac{1}{1}$

$x = -2$ $\qquad y = 5$

$(x, y) = (-2, 5)$

$x - 3y - 7 = 0$

$3x - 3y - 15 = 0$

x	y	1
-3	-7	1
-3	-15	3

x	y	1
$-3(-15) - (-3)(-7)$	$-7(3) - (-15)(1)$	$1(-3) - (3)(-3)$

x	y	1
$45 - 21$	$-21 + 15$	$-3 + 9$

x	y	1
24	-6	6

$$\frac{x}{24} = \frac{1}{6} \qquad \frac{y}{-6} = \frac{1}{6}$$

$$x = \frac{24}{6_1}^{4} \qquad y = \frac{-6}{6_1}^{-1}$$

$(4, -1)$

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2 $7x + 4y = 12$

$3x + 4y = -4$

$7x + 4y - 12 = 0$

$3x + 4y + 4 = 0$

x	y	1
4	-12	7	4
4	4	3	4

$$\frac{x}{4(4)-4(-12)} = \frac{y}{-12(3)-4(7)} = \frac{1}{7(4)-3(4)}$$

$$\frac{x}{16+48} = \frac{y}{-36-28} = \frac{1}{28-12}$$

$$\frac{x}{64} = \frac{y}{-64} = \frac{1}{16}$$

$$\frac{x}{64} = \frac{1}{16} \qquad \frac{y}{-64} = \frac{1}{16}$$

$$x = \frac{64^{4}}{16_{1}} \qquad y = \frac{-64^{4}}{16_{1}}$$

$x = 4$ $\qquad y = -4$

$(4, -4)$

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3 $4x + 3y = 28$
$9x - 5y = 63$

$4x + 3y - 28 = 0$
$9x - 5y - 63 = 0$

x	y	1
3	-28	4
-5	-63	9

$$\frac{x}{3(-63)-(-28)(9)} = \frac{y}{-28(9)-(-63)(4)} = \frac{1}{4(-5)-9(3)}$$

$$\frac{x}{-189-140} = \frac{y}{-252+252} = \frac{1}{-20-27}$$

$$\frac{x}{-329} = \frac{y}{0} = \frac{1}{-47}$$

$$\frac{x}{-329} = \frac{1}{-47} \qquad \frac{y}{0} = \frac{1}{-47}$$

$$x = \frac{+329}{+47_1} \qquad y = \frac{0}{-47}$$

$x = 7$ $\qquad y = 0$

$(7, 0)$

$3x - 5y = 3 \times 3$

$2x + 3y = -17 \times 5$

$9x - 15y = 9$

$10x + 15y = -85$

$19x = -76$

$x = \frac{-76}{19}$

$x = 4$

Putting $x = 4$ in (1)

$3(-4) - 5y = 3$

$-12 - 5y = 3$

$-5y = 3 + 12$

$-5y = 15$

$y = \frac{15}{-5}$

$y = -3$

Date: / /

$3x + 2y = 53 \quad \times 3$

$2x + 3y = 47 \quad \times 2$

$9x + 6y = 159$

$4x + 6y = 94$

$- \quad - \quad -$

$5x = 65$

$x = \frac{65}{5}^{13}$

$x = 13$

Putting $x = 13$ in Equation (2)

$2(13) + 3y = 47$

$26 + 3y = 47$

$3y = 47 - 26$

$3y = 21$

$y = \frac{21}{3}^{7}$

$y = 7$

$(x, y) = (13, 7)$

53
× 3
159

47
× 2
94

159
94
65

MON TUE WED THU FRI SAT

$\frac{1}{2x} + \frac{1}{3y} = 2$

$\frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$

Let $\frac{1}{x} = a$ $\quad \frac{1}{y} = b$

$\therefore \frac{a}{2} + \frac{b}{3} = \frac{2}{1}$ $\quad \times 6$

$\times 3 \quad \times 2$

$\frac{a}{3} + \frac{b}{2} = \frac{13}{6}$

$\times 2 \quad \times 3 \quad \times 1$

$3a + 2b = 12 \times 2$

$2a + 3b = 13 \times 3$

$6a + 4b = 24$

$6a + 9b = 39$

$-5b = -15$

$b = \frac{-15}{-5}^{3}$

$b = 3$

Putting $b = 3$ in Eq (1)

$3a + 2(3) = 12$

$3a + 6 = 12$

$3a = 12 - 6$

$3a = 6$

$a = \frac{6}{3}^{2}$

$a = 2$

$(2, 3)$

Comparing

$\frac{1}{x} = a$ $\quad \frac{1}{y} = b$

$\frac{1}{x} = 2$ $\quad \frac{1}{y} = 3$

$x = \frac{1}{2}$ $\quad y = \frac{1}{3}$

$\left(\frac{1}{2}, \frac{1}{3}\right)$

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$\frac{5}{x-1} + \frac{1}{y-2} = 2$

$\frac{6}{x-1} - \frac{3}{y-2} = 1$

Let $\frac{1}{x-1} = a \quad \frac{1}{y-2} = b$

$5a + 1b = 2 \times 3$

$6a - 3b = 1$

$15a + 3b = 6$

$6a - 3b = 1$

$21a = 7$

$a = \frac{7}{21}$

$a = \frac{1}{3}$

Putting $a = \frac{1}{3}$ in Eq (1)

~~$5a + 1b = 2$~~

$5(\quad)$

$6a - 3b = 1$

$\overset{2}{\cancel{6}}\left(\frac{1}{\cancel{3}_1}\right) - 3b = 1$

$2 - 3b = 1$

$-3b = 1 - 2$

$-3b = -1$

$b = \frac{1}{3}$

Comparing

$\frac{1}{x-1} = a \qquad \frac{1}{y-2} = b$

$\frac{1}{x-1} = \frac{1}{3} \qquad \frac{1}{y-2} = \frac{1}{3}$

$x - 1 = 3 \qquad y - 2 = 3$

$x = 3 + 1 \qquad y = 3 + 2$

$x = 4 \qquad y = 5$

$(4, 5)$

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$\frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4}$

$\frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = -\frac{1}{8}$

Let $\frac{1}{3x+y} = a$ & $\frac{1}{3x-y} = b$

$\frac{a}{x4} + \frac{b}{x4} = \frac{3}{x1}$

$\frac{a}{2x4} - \frac{b}{2x4} = \frac{-1}{8x1}$

$4a + 4b = 3$

$4a - 4b = -1$

$8a = 2$

$a = \frac{2^1}{8_4}$

$a = \frac{1}{4}$

Putting $a = \frac{1}{4}$ in Eq (1)

$4\left(\frac{1}{4}\right) + 4b = 3$

$1 + 4b = 3$

$4b = 3 - 1$

$b = \frac{2^1}{4_2}$

$b = \frac{1}{2}$

Comparing

$\frac{1}{3x+y} = a$ $\quad \frac{1}{3x-y} = b$

$\frac{1}{3x+y} = \frac{1}{4}$ $\quad \frac{1}{3x-y} = \frac{1}{2}$

$3x + y = 4$

$3x - y = 2$

$6x = 6$

$x = \frac{6^1}{6_1}$

$x = 1$

Putting $x = 1$ in Eq (1)

$3(1) + y = 4$

$3 + y = 4$

$y = 4 - 3$

$y = 1$

$(1, 1)$

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$\frac{10}{x+y} + \frac{2}{x-y} = 4$

$\frac{15}{x+y} - \frac{5}{x-y} = -2$

Let $\frac{1}{x+y} = a$ $\frac{1}{x-y} = b$

$10a + 2b = 4 \times 5$

$15a - 5b = -2 \times 2$

$50a + 10b = 20$

$30a - 10b = -4$

$80a = 16$

$a = \frac{16^{1}}{80_{5}}$

$a = \frac{1}{5}$

Putting $a = \frac{1}{5}$ in Eq (1)

$\overset{2}{10}\left(\frac{1}{\cancel{5}_{1}}\right) + 2b = 4$

$2 + 2b = 4$

$2b = 4 - 2$

$b = \frac{2^{1}}{2_{1}}$

$b = 1$

Comparing

$\frac{1}{x+y} = a$ $\frac{1}{x-y} = b$

$\frac{1}{x+y} = \frac{1}{5}$ $\frac{1}{x-y} = 1$

$x + y = 5$

$x - y = 1$

$2x = 6$

$x = \frac{6^{3}}{2_{1}}$

$x = 3$

Putting $x = 3$ in (3)

$3 + y = 5$

$y = 5 - 3$

$y = 2$

$(3, 2)$

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1 $3x + 4y = 10$

$2x - 2y = 2$

$3x + 4y - 10 = 0$

$2x - 2y - 2 = 0$

$a_1 = 3 \quad b_1 = 4 \quad c_1 = -10$

$a_2 = 2 \quad b_2 = -2 \quad c_2 = -2$

$\frac{a_1}{a_2} = \frac{3}{2}$

$\frac{b_1}{b_2} = \frac{4}{-2} = \frac{-2}{1}$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

∴ Equation has unique solution

→ Consistant & Independent graph

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2 $3x - 5y - 20 = 0$

$6x - 10y - 40 = 0$

$a_1 = 3 \quad b_1 = -5 \quad c_1 = -20$

$a_2 = 6 \quad b_2 = -10 \quad c_2 = -40$

$\frac{a_1}{a_2} = \frac{3^1}{6_2} = \frac{1}{2}$

$\frac{b_1}{b_2} = \frac{-5^1}{-10_2} = \frac{1}{2}$

$\frac{c_1}{c_2} = \frac{-20^1}{-40_2} = \frac{1}{2}$

$\therefore \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\therefore$ Equation has infinitely many solution

$\therefore$ Consistent & Dependent graph

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* Find missing values

1) $4x + Py + 8 = 0$
$2x + 2y + 2 = 0$

Find value of P Equation has unique solution

$a_1 = 4$ $b_1 = P$ $C_1 = 8$
$a_2 = 2$ $b_2 = 2$ $C_2 = 2$

Here Equation has unique solution

$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\therefore \frac{4}{2} \neq \frac{P}{2}$

$P \neq 4$

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3 $Kx + 3y - (K-3) = 0$

$12x + Ky - K = 0$

Find value of K
Equation has infinitely many solutions

$a_1 = K \quad b_1 = 3 \quad c_1 = (-K+3) - (K-3)$

$a_2 = 12 \quad b_2 = K \quad c_2 = -K$

Here Equation has infinitely many solution

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2}$$

$$\frac{K}{12} = \frac{3}{K}$$

$$\sqrt{K^2} = \sqrt{36}$$

$$K = \pm 6$$

$$\frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{3}{K} = \frac{+(K-3)}{+K}$$

$$3 = K - 3$$

$$6 = K$$

$$K = 6$$

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$\therefore 48b - 6 = 42b$

$\therefore 48b - 42b = 6$

$\therefore 6b = 6$

$b = \frac{6^{1}}{6_{1}}$

$b = 1$

$\therefore a = 5b$

$a = 5(1)$

$a = 5$

$a = 5$

$b = 1$

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IMP

Infinitely many solutions

4 $2x + 3y = 7$

$(a-b)x + (a+b)y = 3a + b - 2$

$a_1 = 2 \quad b_1 = 3 \quad c_1 = 7$

$a_2 = a-b \quad b_2 = a+b \quad c_2 = 3a + b - 2$

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{a_1}{a_2} = \frac{b_1}{b_2}$

$\frac{2}{a-b} = \frac{3}{a+b}$

$2(a+b) = 3(a-b)$

$2a + 2b = 3a - 3b$

$2a - 3a = -3b - 2b$

$-a = -5b$

$a = 5b$

Now

$\frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{3}{a+b} = \frac{7}{3a+b-2}$

$3(3a + b - 2) = 7(a+b)$

$9a + 3b - 6 = 7a + 7b \quad (a = 5b)$

$9(5b) + 3b - 6 = 35b + 7b$

$45b + 3b - 6 = 35b + 7b$

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No solution

$3x + y = 1$

$(2k-1)x + (k-1)y = 2k + 1$

$a_1 = 3 \quad b_1 = 1 \quad c_1 = 1$

$a_2 = 2k-1 \quad b_2 = k-1 \quad c_2 = 2k+1$

Equation has no solution

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2}$$

$$\frac{3}{2k-1} \quad \frac{1}{k-1}$$

$3(k-1) = 2k-1$

$3k - 3 = 2k - 1$

$3k - 2k = -1 + 3$

$k = 2$