NCERT EXERCISE 3.4

Solve the following pair of linear equations by the elimination method :

(i) $x + y = 5$ and $2x - 3y = 4$

(ii) $3x + 4y = 10$ and $2x - 2y = 2$

(iii) $3x - 5y - 4 = 0$ and $9x = 2y + 7$

(iv) $\dfrac{x}{2} + \dfrac{2y}{3} = -1$ and $x - \dfrac{y}{3} = 3$

Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method:

(i) If we add 1 to the numerator and subtract 1 from the denominator, a fractio reduces to 1. It becomes $\dfrac{1}{2}$ if we only add 1 to the denominator. What is t fraction?

(ii) Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be tw as old as Sonu. How old are Nuri and Sonu?

(iii) The sum of the digits of a two-digit number is 9. Also, nine times this num is twice the number obtained by reversing the order of the digits. Find number.

(iv) Meena went to a bank to withdraw ₹ 2000. She asked the cashier to giv ₹ 50 and ₹ 100 notes only. Meena got 25 notes in all. Find how many no ₹ 50 and ₹ 100 she received.

(v) A lending library has a fixed charge for the first three days and an addi charge for each day thereafter. Saritha paid ₹ 27 for a book kept for sever while Susy paid ₹ 21 for the book she kept for five days. Find the fixed and the charge for each extra day.

(ii)
$$3x + 4y = 10$$
and
$$2x - 2y = 2$$

Multiplying (ii) by 2 and then adding with (i), we get

$$3x + 4y = 10$$
$$\underline{4x - 4y = 4}$$
$$7x = 14$$

∴
$$x = 2$$

Putting $x = 2$ in (ii),

$$2 \times 2 - 2y = 2$$
$$4 - 2y = 2$$
$$-2y = 2 - 4$$

∴
$$y = \frac{-2}{-2} = 1$$

So the solution is $x = 2, y = 1$. **Ans.**

(iii)
$$3x - 5y - 4 = 0$$
and
$$9x = 2y + 7$$
⇒
$$9x - 2y - 7 = 0$$

Multiplying (i) by 3 and then subtracting with (ii) we get,

$$9x - 15y - 12 = 0$$
$$9x - 2y - 7 = 0$$
$$\underset{-\quad+\quad+}{\underline{}}$$
$$-13y - 5 = 0$$
$$-13y = 5$$

∴
$$y = \frac{-5}{13}$$

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

∴ So, the solution is $\quad x = \frac{9}{13}, \quad y = -\frac{5}{13}$

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

(iv)

$$\frac{3x + 4y}{6} = -1$$

⇒ $\quad 3x + 4y = -6$

∴

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

and

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

⇒ $\quad 3x - y = 9$

∴ Subtracting (i) and (ii), we get

$$3x + 4y = -6$$
$$\underset{-}{3x} \underset{+}{-} y = \underset{-}{9}$$
$$\overline{5y = -15}$$

$$y = \frac{-15}{5} = -3$$

Putting $y = -3$ in (ii), we get

$$3x - (-3) = 9$$

⇒ $\quad 3x + 3 = 9$

⇒ $\quad 3x = 9 - 3 = 6$

∴ $\quad x = 2$

So, the solution is $x = 2, y = -3$ **Ans.**

2. (i) I ⋅ ⋅ ⋅

Let the numerator of the fraction be x and the denominator be y

Then the fraction $= \dfrac{x}{y}$

According to question

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

$$x + 1 = y - 1$$

$$x - y = -1 - 1$$

$$x - y = -2$$

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

$$2x = y + 1$$
$$2x - y = 1$$

Subtracting (*i*) and (*ii*) we get,

$$x - y = -2$$
$$\underline{\underset{-}{2x} \underset{+}{-y} = \underset{-}{1}}$$
$$-x = -3$$

$$\therefore \quad x = 3$$

Putting the value $x = 3$ in equation (*i*)

$$3 - y = -2$$
$$-y = -2 - 3$$
$$\therefore \qquad y = 5$$

So, Fraction $= \dfrac{3}{5}$ **Ans.**

(*ii*) Let th___

(ii) Let the present age of Nuri be x
and the present age of sonu be y
According to question
Five years ago,

$$\text{Age of Nuri} = x - 5$$
and $\quad \text{Age of Sonu} = y - 5$
$\Rightarrow \qquad\qquad x - 5 = 3(y - 5)$
$\Rightarrow \qquad\qquad x - 5 = 3y - 15$
$\Rightarrow \qquad x - 3y - 5 + 15 = 0$
$\therefore \qquad\qquad x - 3y + 10 = 0$

Ten years later,

$$\text{Age of Nuri} = x + 10$$
and $\qquad\qquad \text{Age of Sonu} = y + 10$
$$x + 10 = 2(y + 10)$$
$$x + 10 = 2y + 20$$
$$x - 2y + 10 - 20 = 0$$
$\therefore \qquad\qquad x - 2y - 10 = 0$

Subtracting (i) and (ii) we get,

$$x - 3y + 10 = 0$$
$$x - 2y - 10 = 0$$
$$\underline{\quad - \quad + \quad + \qquad\qquad\qquad}$$
$$-y + 20 = 0$$
$\therefore$
$$y = 20$$

Putting the value $y = 20$ in equation (2), we get
$$x - 2 \times 20 = 10$$
$$x - 40 = 10$$
$\therefore$
$$x = 50$$

∴ Present age of Nuri = 50 years

and present age of sonu = 20 years. **Ans.**

(iii) Let the ten's digit be x

and unit's digit be y

According to question.

$$x + y = 9$$

Two digit number $= 10x + y$

and New number $= 10y + x$

$$9(10x + y) = 2(10y + x)$$

$$90x + 9y = 20y + 2x$$

$$90x - 2x = 20y - 9y$$

$$88x = 11y$$

$$88x - 11y = 0$$

Dividing both the sides by 11

$$8x - y = 0$$

Adding (i) and (ii) we get,

$$x + y = 9$$

$$8x - y = 0$$

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$$9x = 9$$

∴

$$x = 1$$

Putting the value $x = 1$, in equation (i)

$$1 + y = 9$$

∴

$$y = 9 - 1 = 8$$

So, the two digit

$\therefore$ Putting the value $x = 1$, in equation (i)

$$1 + y = 9$$
$$y = 9 - 1 = 8$$

$\therefore$ So, the two digit number

$$= 10x + y = 10 \times 1 + 8 = 18 \qquad \text{A}$$

(iv) Let the no. of ₹ 50 note be x

and that of ₹ 100 note be y

According to question

$$x + y = 25$$

and

$$50x + 100y = 2000$$

Dividing both sides by 50

$\therefore$

$$x + 2y = 40$$

Subtracting (i) and (ii) we get,

$$\begin{array}{r} x + y = 25 \\ x + 2y = 40 \\ \hline - \quad - \\ \hline -y = -15 \end{array}$$

$\therefore \quad y = 15$

Putting the value in $y = 15$ in equation (i)

$$x + 15 = 25$$

$\therefore$

$$x = 10$$

So, number of ₹ 50 notes = 10 and number of ₹ 100 notes