

Exercise 3D

Question 11:

$$(3k + 1)x + 3y - 2 = 0$$

 $(k^2 + 1)x + (k - 2)y - 5 = 0$

these equations are of the form

$$a_1 \times + b_1 y + c_1 = 0$$
, $a_2 \times + b_2 y + c_2 = 0$
 $a_1 = (3k + 1)$, $b_1 = 3$, $c_1 = -2$ and
 $a_2 = (k^2 + 1)$, $b_2 = (k - 2)$, $c_2 = -5$

for no solution, we must have $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

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

 $\frac{3k+1}{k^2+1} = \frac{3}{k-2} \neq \frac{-2}{-5}$
 $\Rightarrow \frac{3k+1}{k^2+1} = \frac{3}{k-2}$ and $\frac{3}{k-2} \neq \frac{2}{5}$
 $(3k+1)(k-2) = 3(k^2+1)$ and $2(k-2) \neq 15$
 $\Rightarrow 3k^2+k-6k-2=3k^2+3$ and $2k-4 \neq 15$
 $\Rightarrow k=-1$ and $k \neq \frac{19}{2}$

Thus, k = -1 also satisfy the condition $k \neq \frac{19}{2}$

Hence, the given system will have no solution when k = -1

Question 12:

The given equations are

$$3x - y - 5 = 0 - (1)$$

$$6x - 2y + k = 0 - (2)$$

Here,
$$a_1 = 3$$
, $b_1 = -1$, $c_1 = -5$

$$a_2 = 6$$
, $b_2 = -2$, $c_2 = k$

$$\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}, \frac{b_1}{b_2} = \frac{-1}{-2} = \frac{1}{2}, \frac{c_1}{c_2} = \frac{-5}{k}$$

Equations (1) and (2) have no solution, if

$$\frac{-5}{k} \neq \frac{1}{2}$$
 or $k \neq -10$

Question 13:

$$kx + 2y - 5 = 0$$

$$3x + y - 1 = 0$$

These equations are of the form

$$a_1x + b_1y + c_1 = 0$$
, $a_2x + b_2y + c_2 = 0$

Where,
$$a_1 = k$$
, $b_1 = 2$, $c_1 = -5$

$$a_2 = 3$$
, $b_2 = 1$, $c_2 = -1$

For unique solution, we must have $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Now,
$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$
 i.e., $\frac{k}{3} \neq \frac{2}{1}$

Thus, for all real values of k other than 6, the given system of equations will have a unique solution

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