RD Sharma Solutions Class 11 Maths Chapter 23 Ex 23.3

Straight Lines Ex 23.3 Q1

The equation of the line having slope m and y-intercept (0, c) is given by:

$$y = mx + c$$

Now, $m = \tan\left(150^0\right) = \frac{-1}{\sqrt{3}}$

and

y-intercept is $(0, 2)$

The required equation of line is

$$y = mx + c$$

$$\Rightarrow \quad y = \frac{-x}{\sqrt{3}} + 2$$

$$\Rightarrow \quad \sqrt{3}y - 2\sqrt{3} + x = 0$$

$$\Rightarrow \quad x + \sqrt{3}y = 2\sqrt{3}$$

Straight Lines Ex 23.3 Q2

(i) With slope 2 and y intercept 3

$m = 2$, point is $(0,3)$

The required equation of line is

$$y = mx + c$$

$$\Rightarrow \quad y = 2x + 3$$

(ii) slope $= \frac{-1}{3}$, y intercept $= (0,-4)$

$m = \frac{-1}{3}$, $c = -4$

The required equation of line is $y = mx + c$

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

$$\Rightarrow \quad 3y + x = -12$$

(iii) $m = -2$, $c = -3$

The required equation of line is

$$y - y_1 = m(x - x_1)$$

Since the line cuts the $x-axis$ at $(-3,0)$ with slope -2, we have,

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

$$\Rightarrow y = -2x - 6$$

$$\Rightarrow 2x + y + 6 = 0$$

Straight Lines Ex 23.3 Q3

The given lines are $x = 0, y = 0$.

The equation of the bisectors of the angles between $x = 0$ and $y = 0$ are:

$$\frac{x}{\sqrt{(1)^2 + (0)^2}} = \pm \frac{y}{\sqrt{(0)^2 + (1)^2}}$$

$$x = \pm y$$

$$x \pm y = 0$$

Straight Lines Ex 23.3 Q4

$\theta = \tan^{-1} 3 \Rightarrow m = \tan\theta = 3$

Intercept in negative direction of $y - axis$ is $(0,-4)$

Hence, required equation of line is

$$y = mx + c$$

$$\Rightarrow \quad y = 3x - 4$$

Straight Lines Ex 23.3 Q5

Here, y intercept, c = -4

The required line is parallel to line joining $(2,-5)$ and $(1,2)$
Let m be the slope of the required line, then

m = slope of $(2,-5)$ and $(1,2)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-(-5)}{1-2} = \frac{7}{-1} = -7$$

$\therefore$ the required equation of line is

$y = mx + c$

$y = -7x - 4$

$7x + y + 4 = 0$

Straight Lines Ex 23.3 Q6

The required equation of line is $y = mx + c$
Here, c = 3

Let m be slope of the required line.

Then,
m $\times$ slope of given line = -1

$$\text{Slope of given line} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-2}{3-4} = \frac{3}{-1} = -3$$

$$\Rightarrow \quad m = \frac{1}{3}$$

So, the required equation is:

$y = mx + c$

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

$x - 3y + 9 = 0$

Straight Lines Ex 23.3 Q7

The required equation of line is $y = mx + c$

Here, $c = -3$

Let m be slope of the required line.

Then,

m × slope of given line = -1

Slope of line joining $(4,3)$ and $(-1,1)$ $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-3}{-1-4} = \frac{-2}{-5} = \frac{2}{5}$

$\Rightarrow \quad m = -\frac{5}{2}$

So, the required equation is:

$y = mx + c$

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

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

$2y + 5x + 6 = 0$

Straight Lines Ex 23.3 Q8

The required equation of line is

$y - y_1 = m(x - x_1)$

where $m = \tan 30^0 = \frac{1}{\sqrt{3}}$

point is $(x_1 y_1) = (0,2)$

$\Rightarrow y - 2 = \frac{1}{\sqrt{3}}(x - 0)$

$x - \sqrt{3}y + 2\sqrt{3} = 0$