Linear Inequations Ex 15.6 Q2(ii)

We have,

$x + 2y \le 3, \quad 3x + 4y \ge 12, \quad y \ge 1, \quad x \ge 0$ and $y \ge 0$

Converting the inequations into equations, we get

$x + 2y = 3, \quad 3x + 4y = 12,$

$y = 1, \quad x = 0$ and $y = 0.$

Region represented by $x + 2y \le 3$:

Putting $x = 0$ in $x + 2y = 3$, we get $y = \frac{3}{2}$

Putting $y = 0$ in $x + 2y = 3$, we get $x = 3$.

$\therefore$ The line $x + 2y = 3$ meets the coordinate axes at $\left(0, \frac{3}{2}\right)$ and $(3,0)$. join these point by a thick line.

Now, putting $x = 0$ and $y = 0$ in $x + 2y \ge 3$, we get $0 \ge 3$.

Clearly, $(0,0)$ satisfies the inequality $x + 2y \le 3$. So, the portion containing the origin represents the solution set of the inequation $x + 2y \le 3$.

Region represented by $3x + 4y \ge 12$:

Putting $x = 0$ in $3x + 4y = 12$, we get $y = \frac{12}{4} = 3$

Putting $y = 0$ in $3x + 4y = 12$, we get $x = \frac{12}{3} = 4$.

$\therefore$ The line $3x + 4y = 12$ meets the coordinate axes of $(0,3)$ and $(4,0)$. Join these points by a thick line.

Now, putting $x = 0$ and $y = 0$ in $3x + 4y \ge 12$, we get $0 \le 12$ This is not possible.

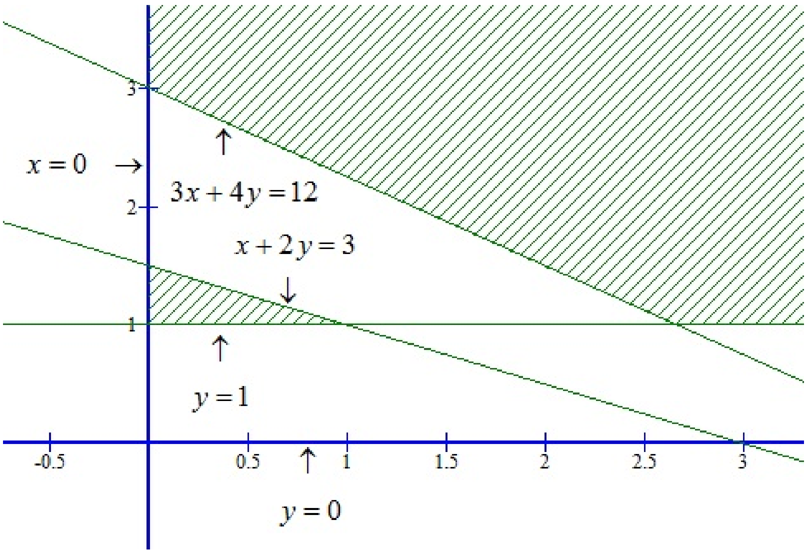
Since, $(0,0)$ does not satisfies the inequation $3x + 4y \ge 12$. So, the portion not containing the origin is represented by the inequation $3x + 4y \ge 12$.

Region represented by $y \ge 1$: Clearly, $y = 1$ is a line parallel to x-axis at a distance of 1 units from the origin. Since $(0,0)$ does not stisfies the inequation $y \ge 1$.

So, the portion not containing the origin is represented by the inequation.

Region represented by $x \ge 0$ and $y \ge 0$:

Clearly, $x \ge 0$ and $y \ge 0$ represent the first quadrant.



Linear Inequations Ex 15.6 Q3

Consider the line $2x + 3y = 6$. we observe that the shaded region and the origin are on the opposite sides of the line $2x + 3y = 6$ and $(0,0)$ does not satisfy the inequation $2x + 3y \geq 6$. So, we must have one inequations as $2x + 3y \geq 6$

Consider the line $4x + 6y = 24$. we observe that the shaded region and the origin are on the same side of the line $4x + 6y = 24$ and $(0,0)$ satisfies the linear inequation $4x + 6y \leq 24$.

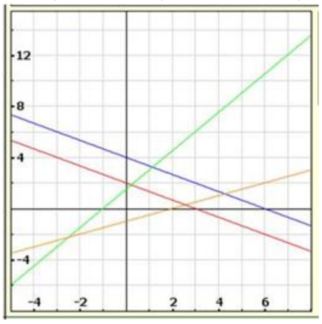
So, the second inequations is $4x + 6y \leq 24$.

Consider the line $-3x + 2y = 3$.
We observe that the shaded region and the origin are on the same side of the line $-3x + 2y = 3$ and $(0,0)$ satisfies the linear inequation $-3x + 2y \leq 3$. so, the third inequations is $-3x + 2y \leq 3$.

Finaly,consider the line $x - 2y = 2$. we observe that the shaded region and the origin are on the same side of the line $x - 2y = 2$ and $(0,0)$ satisfies the linear inequation $x - 2y \leq 2$. so, the forth inequations is $x - 2y \leq 2$.

We also notice that the shaded region is above x-axis and is on the right side of y-axis. so, we must have $x \geq 0$ and $y \geq 0$.

Thus, the linear inequations corresponding to the given solution set are
$2x + 3y \geq 6,\ \ 4x + 6y \leq 24,\ \ -3x + 2y \leq 3,\ \ x - 2y \leq 2,\ \ x \geq 0,\ y \geq 0.$



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