

Unit 5 (All Exercises)

Exercise 5.1

QNo:1

حل کریں اور نمبر لائن پر غلطیاں کریں

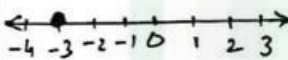
i) $12x + 30 = -6$

$$12x = -6 - 30$$

$$12x = -36$$

$$x = \frac{-36}{12}$$

$$x = -3$$



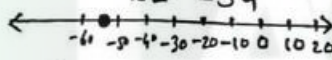
ii) $\frac{x}{3} + 6 = -12$

$$\frac{x}{3} = -12 - 6$$

$$\frac{x}{3} = -18$$

$$x = -18 \times 3$$

$$x = -54$$



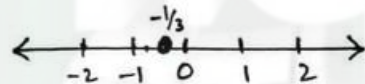
(iii) $\frac{x}{2} - \frac{3x}{4} = \frac{1}{12}$

$$12\left(\frac{x}{2}\right) - 12\left(\frac{3x}{4}\right) = 12\left(\frac{1}{12}\right)$$

$$6x - 9x = 1$$

$$-3x = 1$$

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



(iv) $2 = 7(2x + 4) + 12x$

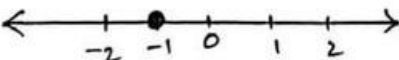
$$2 = 14x + 28 + 12x$$

$$2 - 28 = 26x$$

$$26x = -26$$

$$x = \frac{-26}{26}$$

$$x = -1$$



(v) $\frac{2x-1}{3} - \frac{3x}{4} = \frac{5}{6}$

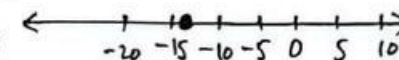
$$12\left(\frac{2x-1}{3}\right) - 12\left(\frac{3x}{4}\right) = 12\left(\frac{5}{6}\right)$$

$$8x - 4 - 9x = 10$$

$$8x - 9x = 4 + 10$$

$$-x = 14$$

$$x = -14$$



(34)

vi) $\frac{-5x}{10} = 9 - \frac{10}{5}x$

$$10\left(\frac{-5x}{10}\right) = 10(9) - 10\left(\frac{10}{5}x\right)$$

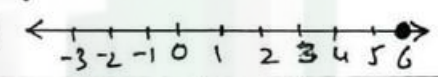
$$-5x = 90 - 20x$$

$$-5x + 20x = 90$$

$$15x = 90$$

$$x = \frac{90}{15}$$

$$x = 6$$



LCM سے ضرب دیں

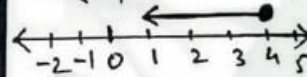
QNo:2

حل کریں اور نمبر لائن پر غلطیاں کریں

(i) $x - 6 \leq -2$

$$x \leq -2 + 6$$

$$x \leq 4$$

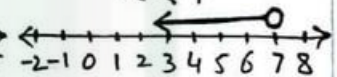


(ii) $-9 > -16 + x$

$$-9 + 16 > x$$

$$7 > x$$

$$x < 7$$



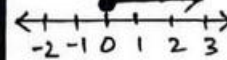
(iii) $3 + 2x \geq 3$

$$2x \geq 3 - 3$$

$$2x \geq 0$$

$$x \geq \frac{0}{2}$$

$$x \geq 0$$



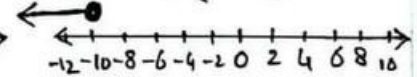
(iv) $6(x + 10) \leq 0$

$$6x + 60 \leq 0$$

$$6x \leq -60$$

$$x \leq \frac{-60}{6}$$

$$x \leq -10$$



(v) $\frac{5x-3}{3} < -\frac{1}{12}$

$$12\left(\frac{5x-3}{3}\right) < 12\left(-\frac{1}{12}\right)$$

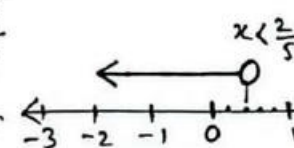
$$20x - 9 < -1$$

$$20x < -1 + 9$$

$$20x < 8$$

$$x < \frac{8}{20}$$

$$x < \frac{2}{5}$$



L.C.M

12 سے ضرب دیں

$$(vi) \frac{1}{4}x - \frac{1}{2} \leq -1 + \frac{1}{2}x$$

$$4(\frac{1}{4}x) - 4(\frac{1}{2}) \leq 4(-1) + 4(\frac{1}{2}x) \quad \text{LCM}$$

$$x - 2 \leq -4 + 2x$$

$$-2 + 4 \leq 2x - x$$

$$2 \leq x$$

$$x \geq 2$$

QNo:3 ایک درجی غیر مساوات کے حل سٹ کے

Shade solution region in xy-plane

$$i) 2x + y \leq 6$$

Associated equation متعلقہ مساوات

$$2x + y = 6$$

For x-intercept

یہ تقاطع کے لیے

$$\text{Put } y = 0$$

$$2x + 0 = 6$$

$$2x = 6$$

$$x = \frac{6}{2}$$

$$x = 3$$

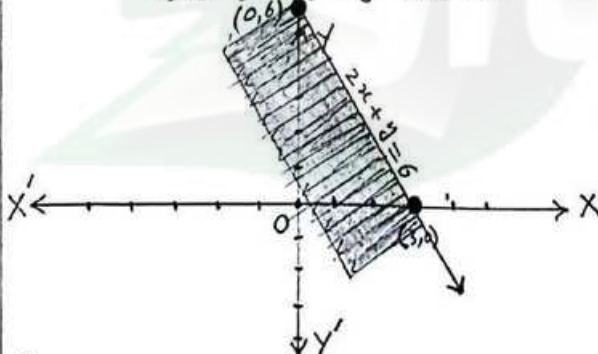
(3, 0) (Test Point)

$$2x + y \leq 6$$

$$0 + 0 \leq 6$$

$0 \leq 6$ True (درست)

Shade کارخ مبرا (Origin) کا طرف ہرکا



$$(ii) 3x + 7y \geq 21$$

Associated equation متعلقہ مساوات

$$3x + 7y = 21$$

For x-intercept

put y = 0 کے لیے تقاطع کے

$$3x + 7(0) = 21$$

$$3x = 21$$

$$x = \frac{21}{3} = 7$$

$$(7, 0)$$

For y-intercept

put x = 0 کے لیے تقاطع کے

$$3(0) + 7y = 21$$

$$7y = 21$$

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

$$(0, 3)$$

35 Test point

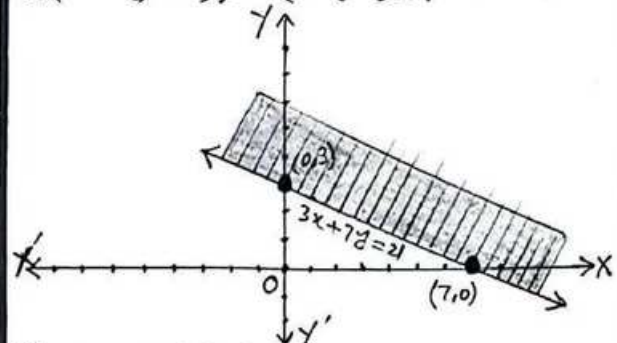
$$3x + 7y \geq 21$$

$$3(0) + 7(0) \geq 21$$

$$0 + 0 \geq 21$$

$$0 \geq 21 \text{ (False) غلط}$$

Shade کارخ مبرا (Origin) سے پر (away) ہرکا



$$(iii) 3x - 2y \geq 6$$

Associated equation متعلقہ مساوات

$$3x - 2y = 6$$

For x-intercept

put y = 0 کے لیے تقاطع کے

$$3x - 2(0) = 6$$

$$3x - 0 = 6$$

$$3x = 6$$

$$x = \frac{6}{3}$$

$$x = 2$$

$$(2, 0)$$

Test point

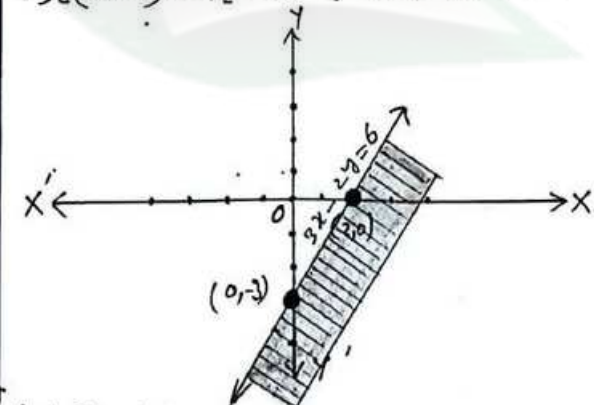
$$3x - 2y \geq 6$$

$$3(0) - 2(0) \geq 6$$

$$0 - 0 \geq 6$$

$$0 \geq 6 \text{ (False) غلط}$$

Shade کارخ مبرا (Origin) سے پر (away) ہرکا



$$(iv) 5x - 4y \leq 20$$

Associated equation متعلقہ مساوات

$$5x - 4y = 20$$

For x-intercept

put y = 0 کے لیے تقاطع کے

For y-intercept

put x = 0 کے لیے تقاطع کے

$$5x - 4(0) = 20$$

$$5x - 0 = 20$$

$$5x = 20$$

$$x = \frac{20}{5}$$

$$x = 4$$

$$(4, 0)$$

$$5(0) - 4y = 20$$

$$0 - 4y = 20$$

$$-4y = 20$$

$$y = -\frac{20}{4}$$

$$y = -5$$

$$(0, -5)$$

Test point آزمائشی نقطہ put $x=0$
 $y=0$

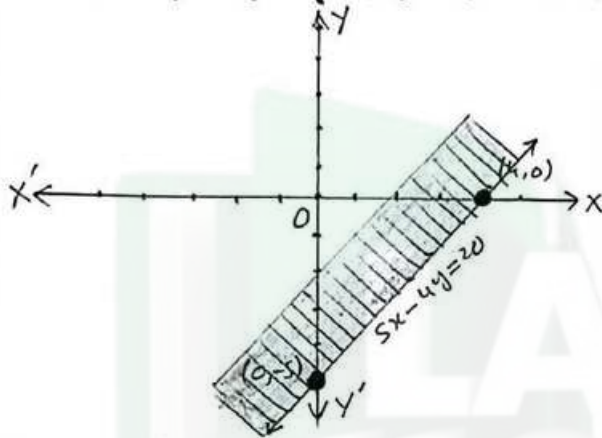
$$5x - 4y \leq 20$$

$$5(0) - 4(0) \leq 20$$

$$0 - 0 \leq 20$$

$$0 \leq 20 \text{ True (درست)}$$

Shade کارخ مبدا (Origin) کی طرف ہوگا۔



$$(v) 2x + 1 \geq 0$$

Associated equation

$$2x + 1 = 0$$

$$2x = -1$$

$$x = -\frac{1}{2} \quad (-\frac{1}{2}, 0)$$

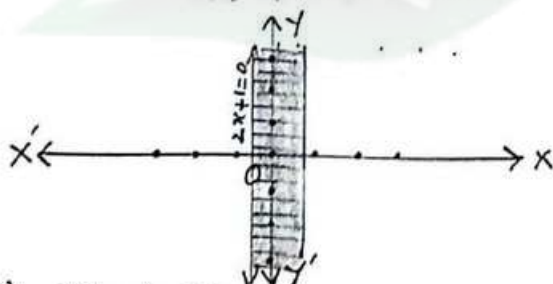
Test point آزمائشی نقطہ put $x=0$
 $y=0$

$$2(0) + 1 \geq 0$$

$$0 + 1 \geq 0$$

$$1 \geq 0 \text{ (True) درست}$$

Shade کارخ مبدا (Origin) کی طرف ہوگا



$$(vi) 3y - 4 \leq 0$$

Associated equation

$$3y - 4 = 0$$

$$3y = 4$$

$$y = \frac{4}{3} = 1\frac{1}{3}$$

$$(0, 1\frac{1}{3})$$

36

Test point آزمائشی نقطہ $x=0$
 $y=0$

$$3y - 4 \leq 0$$

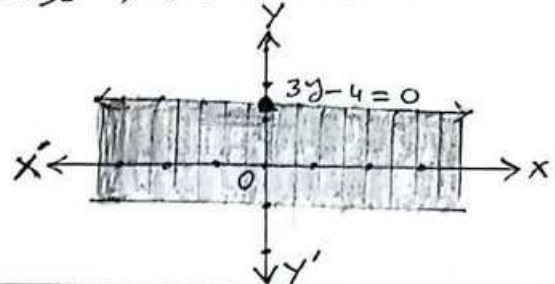
$$3(0) - 4 \leq 0$$

$$0 - 4 \leq 0$$

$$-4 \leq 0$$

True (درست)

Shade کارخ مبدا (Origin) کی طرف ہوگا۔



QNo: 4 ایک درجی غیر مساواتوں کو حل کر کے
Indicate solution region سایہ دار کریں۔

$$(i) 2x - 3y \leq 6 ; 2x + 3y \leq 12$$

Associated equations متعلقہ مساواتیں۔

$$2x - 3y = 6 \rightarrow (i)$$

$$2x + 3y = 12 \rightarrow (ii)$$

x-intercept

y-intercept

x-intercept

y-intercept

put $y=0$

put $x=0$

put $y=0$

put $x=0$

$$2x - 3(0) = 6$$

$$2(0) - 3y = 6$$

$$2x + 3(0) = 12$$

$$2(0) + 3y = 12$$

$$2x - 0 = 6$$

$$0 - 3y = 6$$

$$2x + 0 = 12$$

$$0 + 3y = 12$$

$$2x = 6$$

$$-3y = 6$$

$$2x = 12$$

$$3y = 12$$

$$x = \frac{6}{2}$$

$$y = -\frac{6}{3}$$

$$x = \frac{12}{2}$$

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

$$x = 3$$

$$y = -2$$

$$x = 6$$

$$y = 4$$

$$(3, 0)$$

$$(0, -2)$$

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$$(3, 0)$$

(ii) $x + y \geq 5$; $-y + x \leq 1$

Associated equations متعلقہ مساواتیں

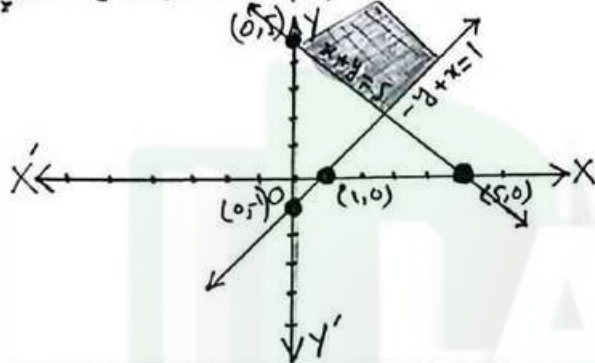
$x + y = 5 \rightarrow (i)$ $-y + x = 1 \rightarrow (ii)$

y-intercept قطعہ y- put $x=0$	x-intercept قطعہ x- put $y=0$	x-intercept قطعہ x- put $y=0$	y-intercept قطعہ y- put $x=0$
$0 + y = 5$ $y = 5$ $(0, 5)$	$x + 0 = 5$ $x = 5$ $(5, 0)$	$0 + x = 1$ $x = 1$ $(1, 0)$	$-y + 0 = 1$ $y = -1$ $(0, -1)$

Test point

$0 + 0 \geq 5$ put $x=0$ $y=0$ $0 \geq 5$ (False)
 $0 + 0 \leq 1$ put $x=0$ $y=0$ $0 \leq 1$ (True)

Shade the region below the origin



(37) (iv) $4x - 3y \leq 12$; $x \geq -\frac{3}{2}$

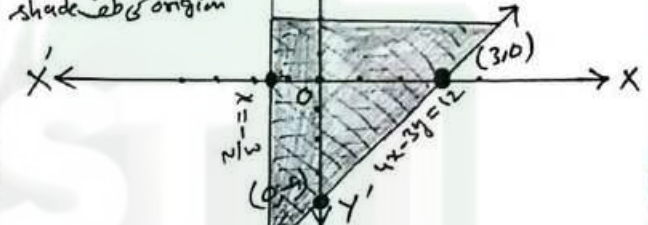
Associated equations متعلقہ مساواتیں

$4x - 3y = 12 \rightarrow (i)$ $x = -\frac{3}{2} \rightarrow (ii)$

x-intercept قطعہ x- put $y=0$	y-intercept قطعہ y- put $x=0$	x-intercept قطعہ x- put $y=0$
$4x - 3(0) = 12$ $4x = 12$ $x = \frac{3 \times 12}{4}$ $x = 3$ $(3, 0)$	$4(0) - 3y = 12$ $0 - 3y = 12$ $y = -\frac{12}{3}$ $y = -4$ $(0, -4)$	$x = -\frac{3}{2}$ $(-\frac{3}{2}, 0)$ $(-1\frac{1}{2}, 0)$

Test point

$4(0) - 3(0) \leq 12$ put $x=0$ $y=0$ $0 \leq 12$ (True)
 $0 \leq 12$ (True)
 Shade the region below the origin



(iii) $3x + 7y \geq 21$; $x - y \leq 2$

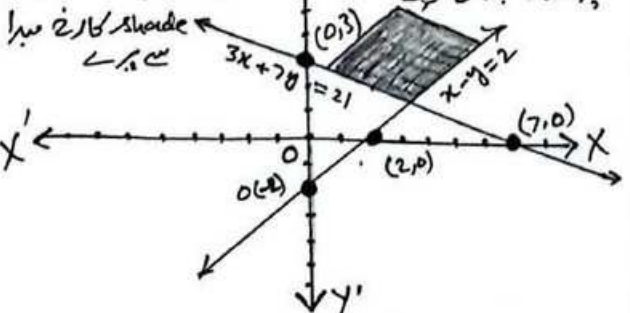
Associated equations متعلقہ مساواتیں

$3x + 7y = 21 \rightarrow (i)$ $x - y = 2 \rightarrow (ii)$

y-intercept قطعہ y- put $x=0$	x-intercept قطعہ x- put $y=0$	y-intercept قطعہ y- put $x=0$	x-intercept قطعہ x- put $y=0$
$3x + 7(0) = 21$ $3x = 21$ $x = \frac{21}{3}$ $x = 7$ $(7, 0)$	$3(0) + 7y = 21$ $0 + 7y = 21$ $7y = 21$ $y = \frac{21}{7}$ $y = 3$ $(0, 3)$	$x - 0 = 2$ $x = 2$ $(2, 0)$	$0 - y = 2$ $y = -2$ $(0, -2)$

Test point

$0 + 0 \geq 21$ put $x=0$ $y=0$ $0 \geq 21$ (False)
 $0 - 0 \leq 2$ put $x=0$ $y=0$ $0 \leq 2$ (True)



(iv) $3x + 7y \geq 21$; $y \leq 4$

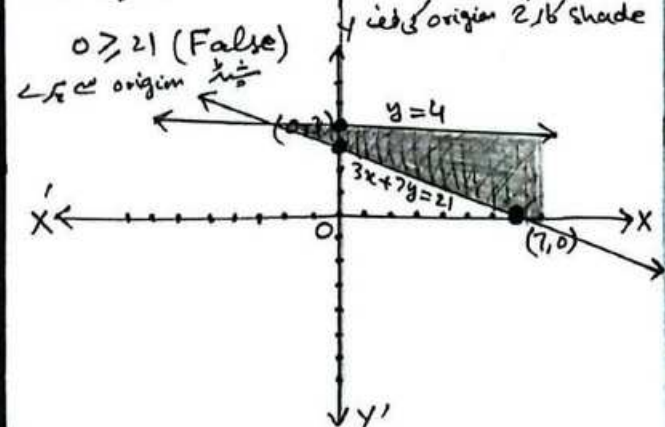
Associated equations متعلقہ مساواتیں

$3x + 7y = 21 \rightarrow (i)$ $y = 4 \rightarrow (ii)$

x-intercept قطعہ x- put $y=0$	y-intercept قطعہ y- put $x=0$
$3x + 7(0) = 21$ $3x = 21$ $x = \frac{21}{3}$ $x = 7$ $(7, 0)$	$3(0) + 7y = 21$ $0 + 7y = 21$ $7y = 21$ $y = \frac{21}{7}$ $y = 3$ $(0, 3)$

Test point

$3(0) + 7(0) \geq 21$ put $x=0$ $y=0$ $0 \geq 21$ (False)
 $0 \leq 4$ put $x=0$ $y=0$ $0 \leq 4$ (True)



(vi) $5x + 7y \leq 35$; $x - 2y \leq 2$

Associated equations متعلقہ مساواتیں

$5x + 7y = 35 \rightarrow (i)$ $x - 2y = 2 \rightarrow (ii)$

x-intercept x-قطع	y-intercept y-قطع	x-intercept x-قطع	y-intercept y-قطع
put $y=0$	put $x=0$	put $y=0$	put $x=0$
$5x + 7(0) = 35$	$5(0) + 7y = 35$	$x - 2(0) = 2$	$0 - 2y = 2$
$5x + 0 = 35$	$0 + 7y = 35$	$x - 0 = 2$	$-2y = 2$
$5x = 35$	$7y = 35$	$x = 2$	$y = -\frac{2}{2}$
$x = \frac{35}{5}$	$y = \frac{35}{7}$	$(2, 0)$	$y = -1$
$x = 7$	$y = 5$		$(0, -1)$
$(7, 0)$	$(0, 5)$		

Test point

$5(0) + 7(0) \leq 35$ put $x=0$

$0 + 0 \leq 35$

$0 \leq 35$ (True)

origin کا رخ shade

کی طرف ہوگا

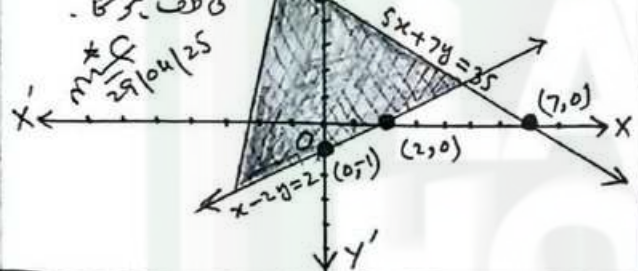
$0 - 2(0) \leq 2$ put $x=0$

$0 - 0 \leq 2$

$0 \leq 2$ (True)

origin کا رخ shade

کی طرف ہوگا



Exercise 5.2

QNo:1 Maximize $f(x,y) = 2x + 5y$

$2y - x \leq 8$; $x - y \leq 4$; $x \geq 0$; $y \geq 0$

Associated equations متعلقہ مساواتیں

$2y - x = 8 \rightarrow (i)$	$x - y = 4 \rightarrow (ii)$
for x-intercept x-قطع کے لیے	for y-intercept y-قطع کے لیے
put $y=0$	put $x=0$
$2(0) - x = 8$	$x - 0 = 4$
$0 - x = 8$	$x = 4$
$-x = 8$	$y = -4$
$x = -8$	$(0, -4)$
$(-8, 0)$	
for y-intercept y-قطع کے لیے	for x-intercept x-قطع کے لیے
put $x=0$	put $y=0$
$2y - 0 = 8$	$0 - y = 4$
$2y = 8$	$-y = 4$
$y = \frac{8}{2}$	$y = -4$
$y = 4$	$(0, -4)$
$(0, 4)$	

Test point

$2(0) - 0 \leq 8$ put $x=0$

$0 - 0 \leq 8$

$0 \leq 8$ (True)

origin کا رخ shade

کی طرف ہوگا

آزمائشی نقطہ

$0 - 0 \leq 4$ put $x=0$

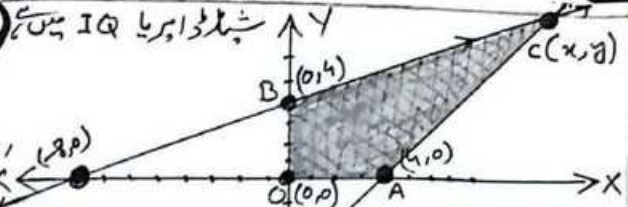
$0 \leq 4$

True

origin کا رخ shade

کی طرف ہوگا

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Corner points are

$O(0,0)$, $A(4,0)$

$B(0,4)$, $C(x,y)$

Adding eq (i) & (ii)

$2y - x = 8$

$-y + x = 4$

$y = 12$

Putting value of y in eq (i)

$2y - x = 8$

$2(12) - x = 8$

$24 - x = 8$

$-x = 8 - 24$

$-x = -16$

$x = 16$

$C(x,y) = C(16,12)$

یہی C(x,y) ہے

مساوات (i) اور (ii) کو جمع کرنے سے

ایک قیمت مساوات (i) میں

درج کرنے سے

یہی C(x,y) ہے

یہی C(x,y) ہے

یہی C(x,y) ہے

یہی C(x,y) ہے

یہی C(x,y) ہے

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یہی C(x,y) ہے

یہی C(x,y) ہے

یہی C(x,y) ہے

یہی C(x,y) ہے

Points	$f(x, y) = x + 3y$	
$O(0,0)$	$f(0,0) = 0 + 3(0) = 0 + 0 = 0$	
$A(4,0)$	$f(4,0) = 4 + 3(0) = 4 + 0 = 4$	
$B(0,5)$	$f(0,5) = 0 + 3(5) = 0 + 15 = 15$	

Maximum at the corner $B(0,5)$

زیادہ سے زیادہ قیمت کو $B(0,5)$ پر ہے۔

QNo:3 Maximize $Z = 2x + 3y$

زیادہ سے زیادہ قیمت معلوم کریں جبکہ

$$2x + y \leq 4; 4x - y \leq 2; x \geq 0; y \geq 0$$

Associated equations متعلقہ مساواتیں

$$2x + y = 4 \rightarrow (i) \quad 4x - y = 2 \rightarrow (ii)$$

for x-intercept for y-intercept for x-intercept for y-intercept

یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے

put $y=0$ put $x=0$ put $y=0$ put $x=0$

$$2x + 0 = 4 \quad 2(0) + y = 4 \quad 4x - 0 = 2 \quad 4(0) - y = 2$$

$$2x = 4 \quad 0 + y = 4 \quad 4x = 2 \quad 0 - y = 2$$

$$x = \frac{2 \times 4}{2} \quad y = 4 \quad x = \frac{2}{4} \quad -y = 2$$

$$x = 2 \quad (0, 4) \quad x = \frac{1}{2} \quad y = -2$$

$$(2, 0) \quad (0, -2)$$

Test point آزمائشی نقطہ

$$2(0) + 0 \leq 4 \quad \text{put } x=0 \quad 4(0) - 0 \leq 2 \quad \text{put } x=0$$

$$0 + 0 \leq 4 \quad y=0 \quad 0 - 0 \leq 2 \quad y=0$$

$$0 \leq 4 \text{ (True)} \quad 0 \leq 2 \text{ (True)}$$

شہدہ حصہ درون کا کام

ابریا ہے

کارفرما (ii) کے لیے مساوات (i) کو جو

$$2x + y = 4$$

$$4x - y = 2$$

$$6x = 6$$

$$x = \frac{6}{6}$$

$$x = 1$$

$$2x + y = 4 \quad 2(1) + y = 4$$

$$2 + y = 4 \quad y = 4 - 2$$

$$y = 2$$

$$C(x, y) = C(1, 2)$$

لہذا

Maximum at the corner $B(0,4)$

زیادہ سے زیادہ قیمت کو $B(0,4)$ پر ہے

30/12/25

39 QNo:4 Minimize $Z = 2x + y$

کم سے کم قیمت معلوم کریں جبکہ

$$x + y \geq 3; 7x + 5y \leq 35; x \geq 0; y \geq 0$$

Associated equations متعلقہ مساواتیں

$$x + y = 3 \rightarrow (i) \quad 7x + 5y = 35 \rightarrow (ii)$$

for x-intercept for y-intercept for x-intercept for y-intercept

یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے

put $y=0$ put $x=0$ put $y=0$ put $x=0$

$$x + 0 = 3 \quad 0 + y = 3 \quad 7x + 5(0) = 35 \quad 7(0) + 5y = 35$$

$$x = 3 \quad y = 3 \quad 7x = 35 \quad 5y = 35$$

$$(3, 0) \quad (0, 3) \quad x = \frac{35}{7} \quad y = \frac{35}{5}$$

$$x = 5 \quad y = 7$$

$$(5, 0) \quad (0, 7)$$

Test point آزمائشی نقطہ

$$0 + 0 \geq 3 \quad \text{put } x=0 \quad 7(0) + 5(0) \leq 35 \quad \text{put } x=0$$

$$0 \geq 3 \text{ (False)} \quad y=0 \quad 0 + 0 \leq 35 \quad y=0$$

$$0 \leq 35 \text{ (True)}$$

Shade کا رخ مبدأ Origin کی طرف ہوگا

Corner points are

$A(3,0), B(5,0)$

$C(0,3), D(0,7)$

Points	$Z = 2x + y$	
--------	--------------	--

$$A(3,0) \quad Z = 2(3) + 0 = 6 + 0 = 6$$

$$B(5,0) \quad Z = 2(5) + 0 = 10 + 0 = 10$$

$$C(0,3) \quad Z = 2(0) + 3 = 0 + 3 = 3$$

$$D(0,7) \quad Z = 2(0) + 7 = 0 + 7 = 7$$

Minimum at the corner $C(0,3)$

کم سے کم قیمت کو $C(0,3)$ پر ہے۔

QNo:5 Maximize $f(x, y) = 2x + 3y$

زیادہ سے زیادہ قیمت معلوم کریں جبکہ

$$2x + y \leq 10; x + 2y \leq 14; x \geq 0; y \geq 0$$

Associated equations متعلقہ مساواتیں

$$2x + y = 10 \rightarrow (i) \quad x + 2y = 14 \rightarrow (ii)$$

for x-intercept for y-intercept for x-intercept for y-intercept

یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے یہ تقاطع کے لیے

put $y=0$ put $x=0$ put $y=0$ put $x=0$

$$2x + 0 = 10 \quad 2(0) + y = 10 \quad x + 2(0) = 14 \quad 0 + 2y = 14$$

$$2x = 10 \quad 0 + y = 10 \quad x + 0 = 14 \quad 2y = 14$$

$$x = \frac{10}{2} \quad y = 10 \quad x = 14 \quad y = \frac{14}{2}$$

$$x = 5 \quad (0, 10) \quad (14, 0) \quad (0, 7)$$

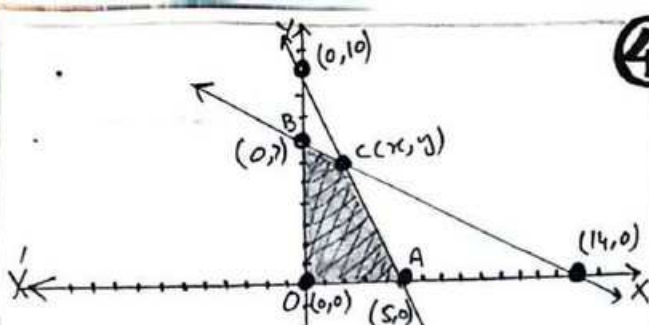
Test point آزمائشی نقطہ

$$2(0) + 0 \leq 10 \quad \text{put } x=0 \quad 0 + 2(0) \leq 14 \quad \text{put } x=0$$

$$0 + 0 \leq 10 \quad y=0 \quad 0 + 0 \leq 14 \quad y=0$$

$$0 \leq 10 \text{ (True)} \quad 0 \leq 14 \text{ (True)}$$

Shade کا رخ مبدأ Origin کی طرف ہوگا



Corner points are
 $O(0,0)$, $A(5,0)$, $B(0,7)$, $C(x,y)$

$$4x + 2y = 20$$

$$+x + 2y = 14$$

$$3x = 6$$

$$x = \frac{6}{3}$$

$$x = 2$$

مساوات (2) کو 2 سے ضرب دینے سے
 (2) اور (1) کو تفریق کرنے سے

x کی قیمت مساوات (2) میں درج کرنے سے

$$2x + y = 10 \quad y = 10 - 4$$

$$2(2) + y = 10 \quad y = 6$$

$$4 + y = 10 \quad y = 6$$

$$C(x,y) = C(2,6)$$

points	$f(x,y) = 2x + 3y$	
$O(0,0)$	$f(0,0) = 2(0) + 3(0) = 0 + 0 = 0$	
$A(5,0)$	$f(5,0) = 2(5) + 3(0) = 10 + 0 = 10$	
$B(0,7)$	$f(0,7) = 2(0) + 3(7) = 0 + 21 = 21$	
$C(2,6)$	$f(2,6) = 2(2) + 3(6) = 4 + 18 = 22$	

Maximum at the point corner $C(2,6)$
 زیادہ سے زیادہ قیمت $C(2,6)$ پر ہے۔

QNo:6 Find minimum & maximum

$z = 3x + y$ کم سے کم اور زیادہ سے زیادہ قیمت معلوم کریں

جسکے $3x + 5y \geq 15$; $x + 3y \leq 9$; $x \geq 0$; $y \geq 0$
 متعلقہ مساواتیں

$3x + 5y = 15 \rightarrow$ (i) $x + 3y = 9 \rightarrow$ (ii)

for x-intercept x-axis کا تقاطع کرنے کے لیے	for y-intercept y-axis کا تقاطع کرنے کے لیے	for x-intercept x-axis کا تقاطع کرنے کے لیے	for y-intercept y-axis کا تقاطع کرنے کے لیے
Put $y=0$	Put $x=0$	Put $y=0$	Put $x=0$
$3x + 5(0) = 15$	$3(0) + 5y = 15$	$x + 3(0) = 9$	$0 + 3y = 9$
$3x + 0 = 15$	$0 + 5y = 15$	$x + 0 = 9$	$3y = 9$
$3x = 15$	$5y = 15$	$x = 9$	$y = \frac{9}{3}$
$x = \frac{15}{3}$	$y = \frac{15}{5}$	$(9,0)$	$(0,3)$
$x = 5$	$y = 3$		
$(5,0)$	$(0,3)$		

Test point

$3(0) + 5(0) \geq 15$ put $x=0$, $y=0$

$$0 + 0 \geq 15$$

$$0 \geq 15 \text{ (False)}$$

Shade کا رخ یہاں (origin)

سے باہر ہوگا

آزمائشی نقطہ

put $x=0$, $y=0$

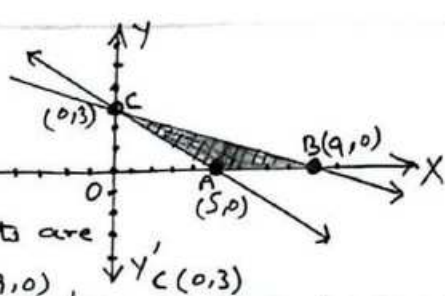
$$0 + 3(0) \leq 9$$

$$0 + 0 \leq 9$$

$$0 \leq 9 \text{ (True)}$$

Shade کا رخ یہاں (origin)

کی طرف ہوگا



Corner points are
 $A(5,0)$, $B(9,0)$, $C(0,3)$

points	$z = 3x + y$	
$A(5,0)$	$z = 3(5) + 0 = 15 + 0 = 15$	
$B(9,0)$	$z = 3(9) + 0 = 27 + 0 = 27$	
$C(0,3)$	$z = 3(0) + 3 = 0 + 3 = 3$	

Maximum at the corner $B(9,0)$

Minimum at the corner $C(0,3)$

زیادہ سے زیادہ قیمت کو $B(9,0)$ پر ہے

کم سے کم قیمت کو $C(0,3)$ پر ہے۔

R. Exercise 5

QNo:2

حل کریں اور نمبر لائن پر ظاہر کریں

i) $\frac{x+5}{3} = 1-x$

3 سے ضرب دینے سے

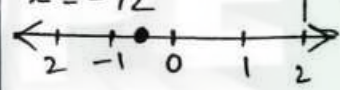
$$x+5 = 3-3x$$

$$x+3x = 3-5$$

$$4x = -2$$

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

$$x = -\frac{1}{2}$$



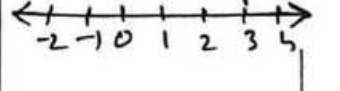
ii) $3x+7 < 16$

$$3x < 16-7$$

$$3x < 9$$

$$x < \frac{9}{3}$$

$$x < 3$$



01/05/25

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

L.C.M. '6' سے ضرب دینے سے

$$2 \cdot 6 \left(\frac{2x+1}{3} \right) + 6 \left(\frac{1}{2} \right) = 6 \left(1 - \frac{x+1}{3} \right)$$

$$4x+2+3 = 6-2x-2$$

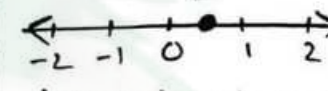
$$4x+5 = 8-2x$$

$$4x+2x = 8-5$$

$$6x = 3$$

$$x = \frac{3}{6}$$

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



iii) $5(x-3) \geq 26x - (10x+4)$

$$5x-15 \geq 26x-10x-4$$

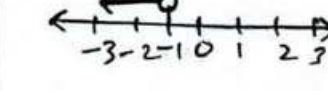
$$5x-15 \geq 16x-4$$

$$5x-16x \geq -4+15$$

$$-11x \geq 11$$

$$x \leq \frac{-11}{-11}$$

$$x \leq -1$$



Q.No:3

Salution region
Linear eq

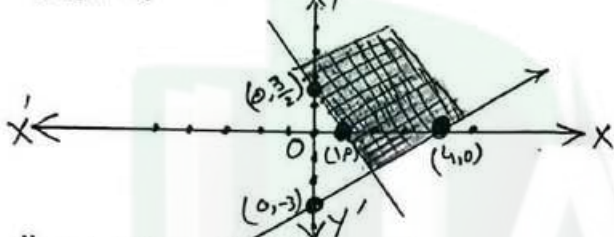
41

(i) $3x - 4y \leq 12$; $3x + 2y \geq 3$
Associated equations

$3x - 4y = 12 \rightarrow$ (i) $3x + 2y = 3 \rightarrow$ (ii)

for x-intercept	for y-intercept	for x-intercept	for y-intercept
$\frac{12}{3} = 4$	$\frac{12}{-4} = -3$	$\frac{3}{3} = 1$	$\frac{3}{2} = 1.5$
put $y=0$	put $x=0$	put $y=0$	put $x=0$
$3x - 4(0) = 12$	$3(0) - 4y = 12$	$3x + 2(0) = 3$	$3(0) + 2y = 3$
$3x = 12$	$-4y = 12$	$3x = 3$	$2y = 3$
$x = 4$	$y = -3$	$x = 1$	$y = 1.5$
(4, 0)	(0, -3)	(1, 0)	(0, 1.5)

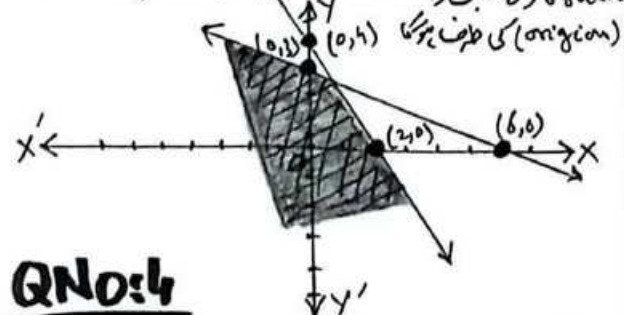
Test point
 $3(0) - 4(0) \leq 12$ put $x=0$
 $0 \leq 12$ True
 $3(0) + 2(0) \geq 3$ put $x=0$
 $0 \geq 3$ False



(ii) $2x + y \leq 4$; $x + 2y \leq 6$
Associated equations

for x-intercept	for y-intercept	for x-intercept	for y-intercept
$\frac{4}{2} = 2$	$\frac{4}{1} = 4$	$\frac{6}{1} = 6$	$\frac{6}{2} = 3$
put $y=0$	put $x=0$	put $y=0$	put $x=0$
$2x + 0 = 4$	$2(0) + y = 4$	$x + 2(0) = 6$	$0 + 2y = 6$
$2x = 4$	$0 + y = 4$	$x = 6$	$2y = 6$
$x = 2$	$y = 4$	$x = 6$	$y = 3$
(2, 0)	(0, 4)	(6, 0)	(0, 3)

Test point
 $2(0) + 0 \leq 4$ put $x=0$
 $0 \leq 4$ True
 $0 + 2(0) \leq 6$ put $x=0$
 $0 \leq 6$ True



Q.No:4

Find maximum value of $g(x, y) = x + 4y$
Subject to $x + y \leq 4$; $x \geq 0$; $y \geq 0$

Associated equation
 $x + y = 4 \rightarrow$ (i)

for x-intercept
 $\frac{4}{1} = 4$

put $y=0$
 $x + 0 = 4$
 $x = 4$
(4, 0)

Test point
 $0 + 0 \leq 4$
 $0 \leq 4$ True

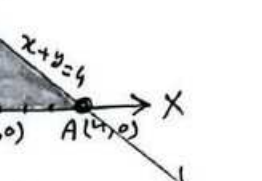
Corner points
are $O(0, 0)$,
 $A(4, 0)$,
 $B(0, 4)$

Points $g(x, y) = x + 4y$
 $g(0, 0) = 0 + 4(0) = 0$
 $g(4, 0) = 4 + 4(0) = 4$
 $g(0, 4) = 0 + 4(4) = 16$
Maximum value is at corner $B(0, 4)$

for y-intercept
 $\frac{4}{1} = 4$

put $x=0$
 $0 + y = 4$
 $y = 4$
(0, 4)

Test point
 $0 + 0 \leq 4$
 $0 \leq 4$ True



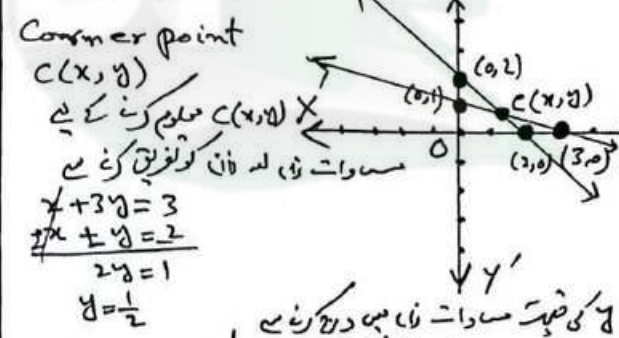
Q.No:5

Find minimum value of
 $f(x, y) = 3x + 5y$ Subject to $x + 3y \geq 3$; $x + y \geq 2$; $x \geq 0$; $y \geq 0$

Associated equations
 $x + 3y = 3 \rightarrow$ (i) $x + y = 2 \rightarrow$ (ii)

for x-intercept	for y-intercept	for x-intercept	for y-intercept
$\frac{3}{1} = 3$	$\frac{3}{3} = 1$	$\frac{2}{1} = 2$	$\frac{2}{1} = 2$
put $y=0$	put $x=0$	put $y=0$	put $x=0$
$x + 3(0) = 3$	$0 + 3y = 3$	$x + 0 = 2$	$0 + y = 2$
$x = 3$	$y = 1$	$x = 2$	$y = 2$
(3, 0)	(0, 1)	(2, 0)	(0, 2)

Test point
 $0 + 3(0) \geq 3$ put $x=0$
 $0 \geq 3$ False
 $0 + 0 \geq 2$ put $x=0$
 $0 \geq 2$ False



Corner point
 $C(x, y)$
 $x + 3y = 3$
 $x + y = 2$
 $2y = 1$
 $y = \frac{1}{2}$
 $x + 3(\frac{1}{2}) = 3$
 $x + \frac{3}{2} = 3$
 $x = 3 - \frac{3}{2} = \frac{3}{2}$
 $C(\frac{3}{2}, \frac{1}{2})$

Point $f(x, y) = 3x + 5y$
 $f(\frac{3}{2}, \frac{1}{2}) = 3(\frac{3}{2}) + 5(\frac{1}{2})$
 $= \frac{9}{2} + \frac{5}{2} = \frac{14}{2} = 7$
Minimum value at corner $C(\frac{3}{2}, \frac{1}{2})$