REVIEW EXERCISE

Q.1 Four options are given against each statement. Encircle the correct option.

(i) In the following, linear equation is:
(a) $5x>7$ (b) $4x-2<1$
(c) $2x+1=1$ (d) $4=1+3$

(ii) Solution of $5x-10=10$ is:
(a) 0 (b) 50
(c) 4 (d) –4

(iii) If $7x+4<6x+6$, then x belongs to the interval
(a) $(2,\infty)$ (b) $[2,\infty)$
(c) $(-\infty,2)$ (d) $(-\infty,2]$

(iv) A vertical line divides the plane into
(a) Left half plane
(b) Right half plane
(c) Full plane
(d) Two half planes

(v) The equation formed from the linear inequality is called
(a) Linear equation
(b) Associated equation
(c) Quadratic equation
(d) None of these

(vi) $3x+4<0$ is:
(a) Equation (b) Inequality
(c) Not inequality (d) Identity

(vii) Corner point is also called:
(a) Code (b) Vertex
(c) Curve (d) Region

(viii) $(0,0)$ is solution of inequality
(a) $4x+5y>8$ (b) $3x+y>6$
(c) $-2x+3y<0$ (d) $x+y>4$

(ix) The solution region restricted to the first quadrant is called:
(a) Solution function
(b) Feasible function
(c) Solution region
(d) Constraints region

(x) A function that is to be maximized or minimized is called:
(a) Solution function
(b) Objective function
(c) Feasible function
(d) None of these

Answer Key

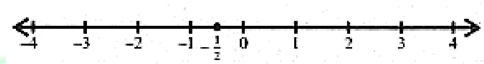
1	c	**2**	c	**3**	c	**4**	d	**5**	b
6	b	**7**	b	**8**	c	**9**	b	**10**	b

Q.2 Solve and represent their solutions on real line.

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

Ans:

$x+5=3(1-x)$
$x+5=3-3x$
$x+3x=3-5$
$4x=-2$
$x=\dfrac{-2}{4}$
$x=\dfrac{-1}{2}$



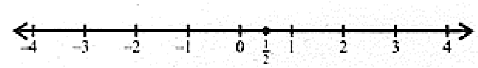
(ii) $\dfrac{2x+1}{3}+\dfrac{1}{2}=1-\dfrac{x-1}{3}$

Ans:

$\dfrac{2(2n+1)+3\times1}{6}=\dfrac{3\times1-(x-1)}{3}$

$4x+2+3=\dfrac{6[3-x+1]}{3}$

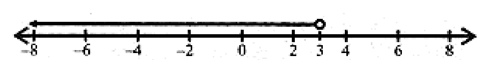
$4x+5=2(-x+4)$
$4x+5=-2x+8$
$4x+2x=8-5$
$6x=3$
$x=\dfrac{3}{6}$
$x=\dfrac{1}{2}$



(iii) $3x+7<16$

Ans:

$3x<16-7$
$3x<9$
$x<\dfrac{9}{3}$
$x<3$

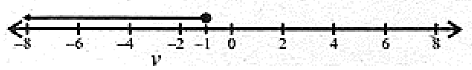


(iv) $5(x-3)\geq 26x-(10x+4)$

Ans:

$5x-15\geq 26x-10x-4$
$5x-15\geq 16x-4$

$-15+4\geq 16x-5x$
$-11\geq 11x$
$\frac{11}{11}\geq x$
$x\leq -1$



Q.3 Find the solution region of the following linear e1qualities.

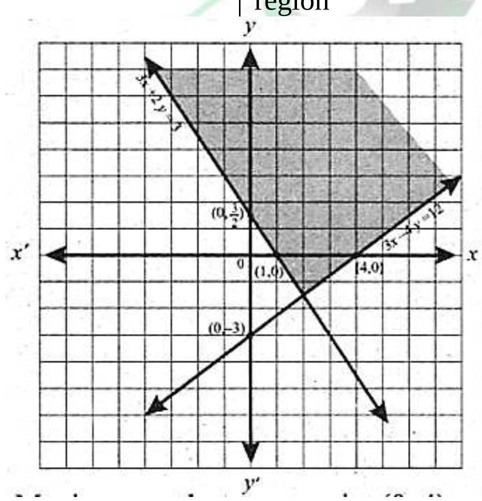
(i) $3x-4y\leq 12;\ 3x+2y\geq 3$

Ans:

Associated form

$3x-4y=12$ ___(i)
Dividing by 12
$\frac{3x}{12}-\frac{4y}{12}=\frac{12}{12}$
$\frac{x}{4}-\frac{y}{3}=1$
x int $(4,0)$
y int $(0,3)$
Test point
$(x,y)=(0,0)$
$3(0)-4(0)\leq 12$
$0\leq 12$
True towards the origin

$3x+2y=3$ ___(ii)
Dividing by 3
$\frac{3x}{3}+\frac{2y}{3}=\frac{3}{3}$
$\frac{x}{1}+\frac{y}{\frac{3}{2}}=1$
x int $(1,0)$
y int $\left(0,\frac{3}{2}\right)$
Test point
$(x,y)=(0,0)$
$3(0)+2(0)\geq 3$
$0\leq 0$
False away from region



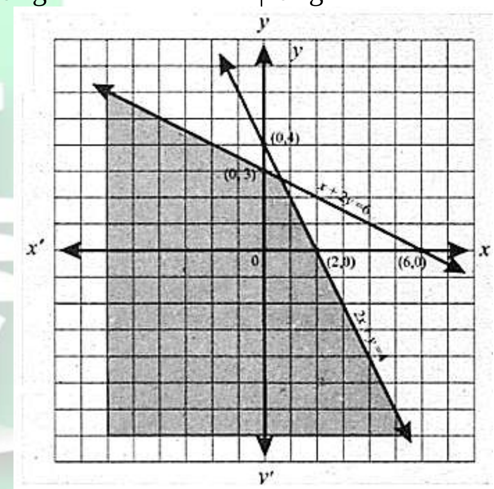
(ii) $2x+y\leq 4;\ x+2y\leq 6$

Ans:

Associated form

$2x+y=4$ ___(i)
Dividing by 4
$\frac{2x}{4}+\frac{y}{4}=\frac{4}{4}$
$\frac{x}{2}+\frac{y}{4}=1$
x int $(2,0)$
y int $(0,4)$
Test point
$(x,y)=(0,0)$
$2(0)+0\leq 4$
$0\leq 4$
True towards the origin

$x+2y=6$ ___(ii)
Dividing by 6
$\frac{x}{6}+\frac{2y}{6}=\frac{6}{6}$
$\frac{x}{6}+\frac{y}{3}=1$
x int $(6,0)$
y int $(0,3)$
Test point
$(x,y)=(0,0)$
$0+2(0)\leq 6$
$0\leq 6$
True towards origin

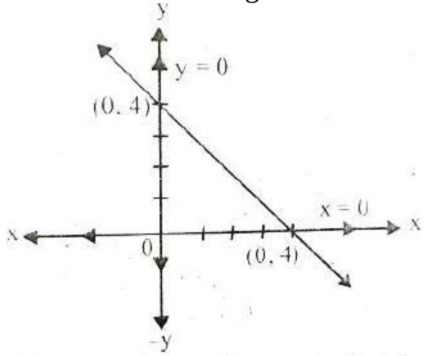


Q.4 Find the maximum value of $g(x,y)=x+4y$ subject to constraints $x+y\leq 4, x\geq 0$ and $y\geq 0$.

Ans:

$x+y\leq 4$
Associated equation
$x+y=4$
Dividing by 4
$\frac{x}{4}+\frac{y}{4}=\frac{4}{4}$
$\frac{x}{4}+\frac{y}{y}=1$
x int $(4,0)$
y int $(0,4)$
Test point
$(x,y)=(0,0)$

$0+0\leq 4$
$0\leq 4$
True towards the origin



Corner points
$(0,0)(4,0)(0,4)$
For maximum
$g(x,y)=x+4y$
$g(0,0)=0+4(0)$
$g(0,0)=0$
$g(4,0)=4+4(0)=4$
$g(0,4)=0+4(4)=16$
Hence $g(x,y)$ is maximum at point $(0,4)$

Q.5 Find the minimum value of $f(x,y)=3x+5y$ subject to constraints $x+3y\geq 3,\ x+y\geq 2,\ x\geq 0,\ y\geq 0.$

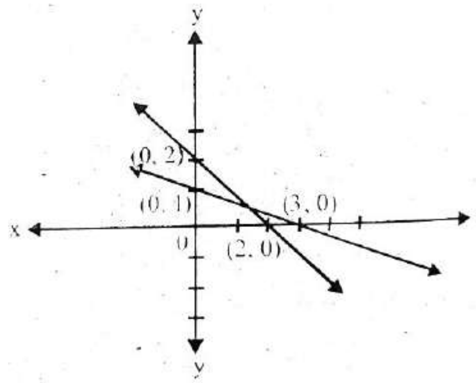
Ans:

Associated equation

$x+3y=3$ ____(i)
Dividing by 3
$\frac{x}{3}+\frac{3y}{3}=\frac{3}{3}$
$\frac{x}{3}=\frac{y}{1}=1$
x int $(3,0)$
y int $(0,1)$
Test point
$(x,y)=(0,0)$
$0+3(0)\geq 0$
$0\leq 3$
Fase away from the region

$x+y=2$ ____(ii)
Dividing by 2
$\frac{x}{2}+\frac{y}{2}=\frac{2}{2}$
$\frac{x}{2}+\frac{y}{2}=1|$
x int $(2,0)$
y int $(0,2)$
Test point
$(x,y)=(0,0)$
$0+0\geq 2$
$0\leq 2$
False away from the region

Corner points



Subtractive (i) and (ii)
$x+3y=3$
$\underline{\pm x\pm y=\pm 2}$
$2y=1$
$y=\frac{1}{2}$
Put it in (ii)
$x+\frac{1}{2}=2$
$x=2-\frac{1}{2}$
$x=\frac{4-1}{2}$
$x=3$
Hence corner points are
$(0,2)\left(\frac{3}{2},\frac{1}{2}\right)(3,0)$
For minimize
$f(x,y)=3x+5y$
$f(0,2)=3(0)+5(g)=10$
$f\left(\frac{3}{2},\frac{1}{2}\right)=3\left(\frac{3}{2}\right)+5\left(\frac{1}{2}\right)=\frac{9}{2}+\frac{5}{2}=\frac{14}{2}=7$
Here $f(x,y)$ is maximum at $\left(\frac{3}{2},\frac{1}{2}\right)$