

ok friends in continuation with previous discussion of linear programming problem now we discuss some problems on this topic linear programming problem

so let us take example solve the lbp means linear programming problem graphically minimize or maximize or and maximize minimize and maximize the objective function z equal

to $3x$ plus $9y$ subject to constants x plus three y less than equal to sixty x plus y greater than equal to ten x less than

equal to y x greater than equal to zero y greater than equal to zero

so these are constants and this

is objective function this is objective function say this is one this is two three and four

so first of all we take associated equation

for the given constants one two three solution associated equation associated equation x plus three y equal to sixty x plus y equal to ten x equal to y

so from one x plus $3y$ equal to 60 put y equal to 0 will give x equal to sixty x equal to zero will give y equal to twenty

so points are sixty zero and zero twenty from to x plus y equal to 10

so put y equal to 0 implies x equal

to 10 x equal to 0 implies y equal to ten

so points are ten zero zero ten from third x equal to y

so put y equal to zero implies

x equal to zero since y equal to m x is a line passing through origin

so this line

x equal to i must passes through origin

so we have to take some another value put x equal

to say 1 this implies y equal to 1 .

so points are zero zero means this line passing through origin

and another point from this where this line passing through is one one now we have points on

the line for all the three associated equation

so draw the graph of these three lines

so we have two point sixty zero say

this point sixty zero and zero twenty

so this point is zero twenty

now join these two points will give the graph of line x plus three y

equal to sixty x plus three y equal to sixty now points on another line

is ten zero and zero ten

so this is ten zero and this is

zero ten

so we have two points ten zero and zero ten join these two points we will get

the equation of line this is x plus y equal to ten x plus y equal to ten now

another zero zero and

one one means zero zero and one one

so this point

so this line passing through this point means put x equal to ten you will get

y equal to ten

so this is ten and ten

so this line passing like this from this point ten ten now in the given problem

the constants are

given as x plus three y less than equal to sixty

so you use origin test for first second and third you

will get 0 plus 3 into 0 equal to 0 which is less than 60 that is true and for

second equation 0 plus 0

means second constant equal to 0 is greater than 10 is false and x less than equal to 0 0 equal to zero is true

so for this x equal to y we

have to check for x equal to y we have to take arbitrary point

say we consider a point 1 2 and we see that 1 is less than 2 is true

so 1 is less than 2 is 2 means

10 is less than 20 is also true if you take ten twenty as a point because we have taken each division as ten

so consider ten twenty ten less than twenty is two it means ten twenty

so this point 10 20 must lies in the defined region in the feasible region of this x equal to y

so this will be the feasible reason for x equal to y and 0 less than 60 in first case is true

so x plus 3y equal to 60 its solution reason will be

this because this region includes sodium and in second case origin test fell so

origin test fail means we have to consider those reason which does not include origin

so finally we see that this part and this is what this

is x greater than equal to 0 and this is y greater than equal to 0.

so

finally we see that this is true this is true and this is true and this

is true it means this reason will be the feasible reason this reason

will be the feasible reason and these points are the corner points these points are the corner

points

so to find exact value of corner points we have to solve this three equation then we will

get exact value of these four corner points say a b c and d

so to get the value of this point a

we have to solve this equation and this equation now from 1 and 3 at the x plus 3y equal to 60 this implies x plus three x is

equal to sixty because x equal to y

so four x equal to sixty this implies x equal to fifteen

so y equal to fifteen it means this point b this point b is fifteen fifteen

so point b is fifteen fifteen because this point b is point

of intersection between line one and three from second and third x plus y equal to ten this implies x plus x equal to ten

so two x equal to ten this implies x equal to five as x equal to y so y equal to five

so point of intersection between

line two and three is a

so this a is five and five

so a is five and five and this point c is zero twenty

and this point d is zero ten corner points of feasible reason feasible reason a

b c d are a five five b fifteen fifteen c zero twenty and d zero ten now

according to problem we have to we have to

maximize or minimize the objective function z equal to three x plus nine y under this constant

so value of z equal to three x plus nine y at corner points are z a equal to

three into five plus 9 into 5 equal to 60 that be equal to 3 into 45

plus nine into forty five three into fifteen sorry three into fifteen

and nine into fifteen

so forty five plus 135 180 and z equal to $3 \times 0 + 9 \times 20$ equal to 0 plus 180 equal to 180 and z equal to $3 \times 0 + 9 \times 10$ equal to zero plus ninety equal to ninety

so here this is a smallest value and this the largest value we will get at two points largest value will get at two point largest value at b and c since feasible region is bounded region boundary region

so its smallest value will be the minimum value

so z minimum equal to 60 z a smallest value means sixty is the smallest value at a

so z minimum equal to sixty at a a five five since largest value at two points b and c

so z max equal to 180 lies on the line bc that is problem has multiple optimal solution since bc contains any lines contains infinitely many points

so problem has infinitely many

solution now next problem solve lpp graphically minimize z equal to five x plus three y subject to x plus y equal to six x less than equal to four y less than equal to five x greater than equal to zero

y greater than equal to zero solution associated equation for given constants are x plus y equal to six already given x equal to four y equal to five

so from one to x plus y equal to six put y equal to zero implies x equal to 6 x equal to 0 implies y equal to 6.

so points are six zero and zero six from second x equal to 4 is a line parallel to y axis intersect x axis at four zero from third y equal to five is a line parallel to x axis intersect y axis at zero five now from all these information we

draw the graph of these three lines

so now first line passing through 0 6 and 6 0 1 2 3 4 5 6 7 1 2 3 4 5 6 7

so line passing through these two point that is six zero and zero six

so draw this line this line will be x plus this line

represent x plus y equal to six now x equal to four is a line parallel to axis and passing through point four zero

so this is x equal to four and y equal to five is a line passing through zero five and parallel to x axis this is y equal to five so

according to given inequality x plus y equal to six now mark the region

so x and y is greater than equal to 0

means having non negative restriction

so region must include in first quadrant

and x less than equal to four

so this region and why less than equal to five means this region now combining all this condition will get this region and this region but x equal

to x plus y equal to six and y less than equal to four

means x equal to four and y less than equal to five means y

equal to five

so only the solution of this region this constants will lie on this line only first of all find point of intersection

so x plus y equal to six intersect

x equal to four say this is a at point two and this y equal to five at one five this is b

so corner point since the feasible reason is line a b itself feasible reason is line a b with corner points with corner points a four two and b one five
 so objective function given objective function is $z = 5x + 3y$
 so z at a equal to $5x + 3y = 5(4) + 3(2) = 20 + 6 = 26$ and z at b equal to $5x + 3y = 5(1) + 3(5) = 5 + 15 = 20$
 so we have to minimize z
 so z minimum this is smallest value
 so z minimum equal to twenty at b one five
 so here feasible region is line only now let us consider another problem that is solve the lpp graphically minimize $z = 3x + 5y$ subject to $x + 2y \geq 10$
 $x + y \geq 6$
 $3x + y \geq 8$
 $x \geq 0$ and $y \geq 0$ solution associated equation for given constant associated equation for given constants are say this is first this is second third and fourth
 so $x + 2y = 10$ $x + y = 6$ $3x + y = 8$ now from one $x + 2y = 10$ put $y = 0$ implies $x = 10$ $x = 0$ implies $y = 5$
 so points are ten zero and zero five from second $x + y = 6$ put $x = 0$ implies $y = 6$ and $y = 0$ implies $x = 6$
 so points are six zero and zero six from third $3x + y = 8$ put $y = 0$
 so $x = 8/3$ and $x = 0$ implies $y = 8$
 so points are eight by three zero and zero eight if you put $y = 2$ then $x = 2$ put $y = 2$ implies $x = 2$
 so two two is also point line lies on this line because eight by three is something difficult to locate on the line
 so it is very easy to locate two two points on the line
 so draw the graph of this three line for equation one $x + 2y = 10$ zero and zero five points lies on this line eight nine ten
 so this is ten zero and zero five
 so this is zero five
 so join these two point
 so this is line $x + 2y = 10$ now for second points are six zero and zero six this is six zero and this is zero six six zero and zero six this is $x + y = 6$ now for third equation $3x + y = 8$ we have two points zero eight two two zero eight
 so seven eight this is zero eight and two two means this point is
 so join these two points
 so this is $3x + y = 8$
 $x + y = 6$
 so these are three lines now according to sign of inequality we have to define the region

so for first

so we just check origin test four one x plus two y equal greater than equal to 10.

so

0 plus 0 greater than 10 is false it means origin does not lie in the solution region of this inequity x

plus two y greater than ten it means for this this will be the feasible reason this half plane

will represent the solution reason for this x plus two y equal to ten now x plus y greater than equal to six

so four second x plus y greater than equal to 6 means 0 plus

0 equal to 0 is greater than 6 is again false

so again for this line the feasible

region will be in this direction and fourth third three x plus y greater than equal to eight

so 3 into 0 plus

0 equal to 0 is greater than 8 is again false

so for this also the feasible

region will be in this direction and this is x greater than equal to 0 and this is y greater than equal to 0 .

so feasible reason for this will be this green reason the green shaded reason will be the feasible

reason for this now for this feasible reason say this is a this is b and this is c

and this is d a b c d are corner points a b c d are corner points to find

these points we have to solve a is this point a is what this point a is 10 0 and this

point d is 0 8 but to find b and c

so b is 2 4 and c is 1 5 .

so these are the feasible reason

so these are the corner points of the feasible region

so corner points

so corner points of the feasible reason are a ten zero b two four c one five and d zero eight

so value of z at these four

corner points will be z a equal to

so objective function z is

given as z equal to $3x$ plus $5y$

so 3 into 10 plus 5 into 0 equal to thirty z b equal to three into two plus

five into four equal to 26 z c equal to 3 into 1 plus 5 into 5

equal to 28 and z d equal to 3 into 0 plus five into eight equal

to forty

so this is the smallest value and this is the largest value since reason is unbounded region and we have to minimize the objective function

so if we consider this smallest value twenty six then three x plus five y must be less than twenty six if we plot the graph of three x

plus five y equal to twenty six we see that the graph will three x plus two y equal to twenty six

so three x plus two y three x

plus five y three x plus five y line three x plus five y equal to twenty six have no have no common points common points with feasible reason

so z minimum equal to 26 at b two four
so in this way when reason is unbounded
we can find minimum or maximum value ok friends we will discuss some more
problems and concept
in next section ok thank you you

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