Handwritten Notes

On

Linear Programming

* Linear Programming *

Q A Dieler can ~~invest~~ invest 50,000 Rs maximum
We have only ~~cupboard~~ storage place of 60 Pieces of chair or table
Cost of chair = 500
and Profit per chair is 75 Rs.
Cost of table is 2500
and profit Per table is 250 Rs find max. Proffit we can earn.

x — table $x \geq 0$ — ①
y — Chairs $y \geq 0$ — ②

$2500x + 500y \leq 50000$ (Investment Constraint)

$5x + y \leq 100$ — ③

$x + y \leq 60$ (storage constraint — ④

Proffit $\Rightarrow \underbrace{Z}_{\text{maximize}}$

$= 250x + 75y$ — ⑤

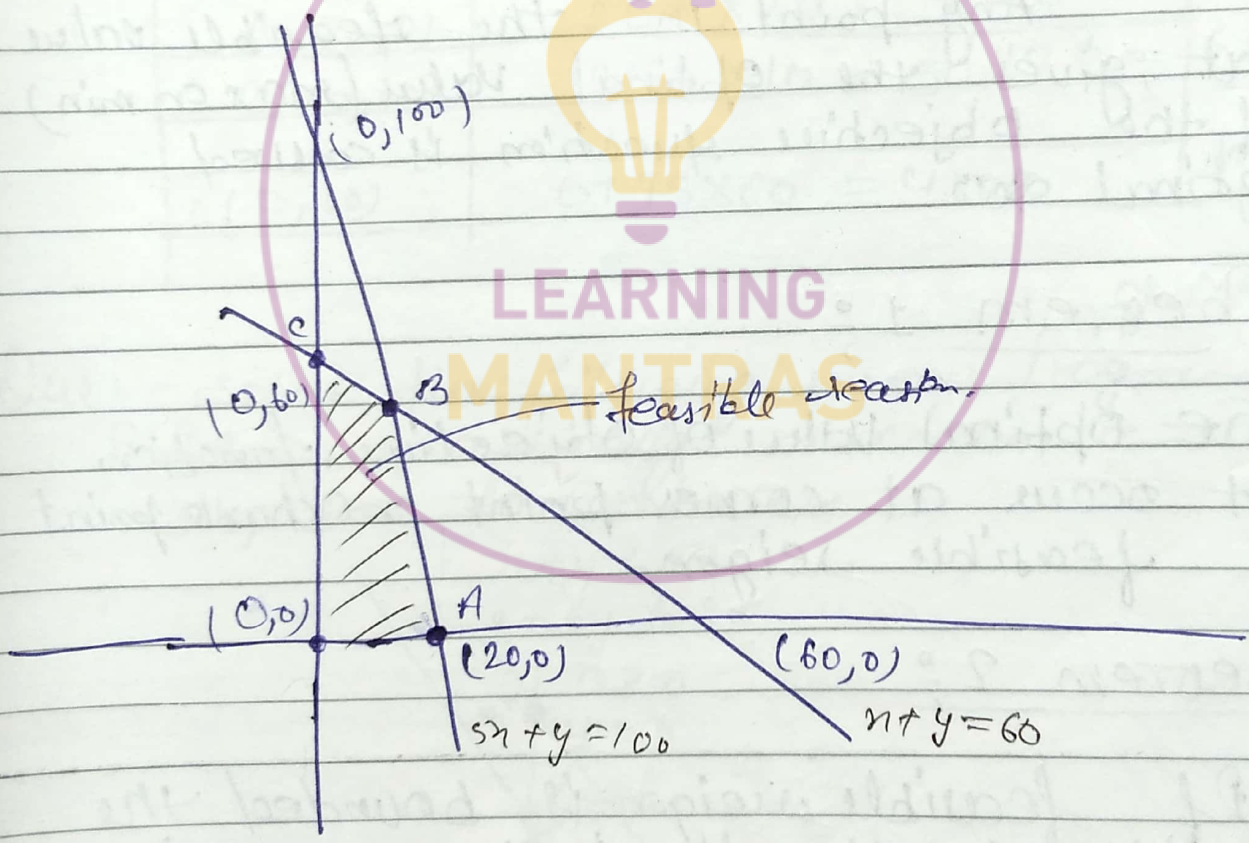
Constraints :-
The linear inequalities or eq^n of ~~inst~~ restriction on the variable of a linear programming are called ~~Constant~~ constraints.

eq^n 1 to 4 is our Constraints.

* objective function:

Linear f^n $z = ax + by$ where a, b are constraints which has to be maximize or minimised is called objective function, Here eq^n 5 is a objection function.

x, y are called decision variables.



* feasible reigon:-

The Common Region determined by all the Constituent is called feasible reigon.

where OABC is our feasible reigon

* feasible solⁿ:

Points with in ~~on~~ and on the feasible reigon are called feasibl solⁿ

* optinal solⁿ:

Any point in the feasible value that gives the optinal value (max or min) of the objective function is called optinal solⁿ.

* Theorem 1:

The optinal value of objective function must occur at corner point or shark point of feasible reigon

* Theorem 2:

If feasible reigon is bounded the objective function has both max. and minimum value which occur at corner points.

* If ~~the~~ feasible reigon is unbounded the optinal solⁿ may not exist

If it exist then we have to check its Credibility.

Optinal solution must not have common sol^n with feasible reigen otherwise it doesn't exist

Point	Value of z
O (0,0)	0
A (20,0)	250 X 20 = 5000
B (10,50)	250 X 10 + 50 X 75 = 6250
C (0,60)	0 + 75 X 60 = 4500

6250 max value

Optical Sol^n.

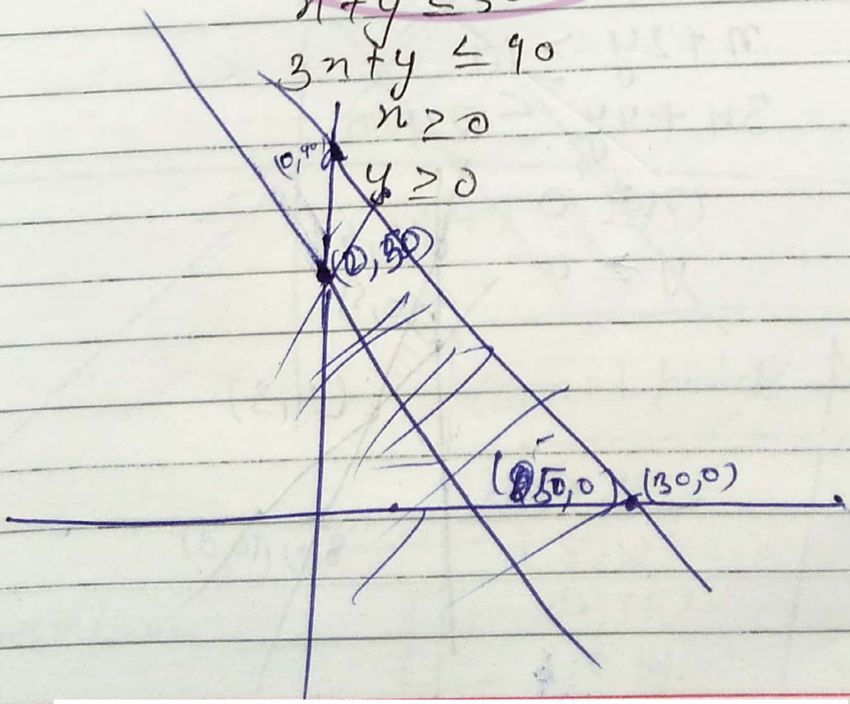
Que: solve the following linear programming problem graphically maximum $z = 4x + y$ subjected to constraints

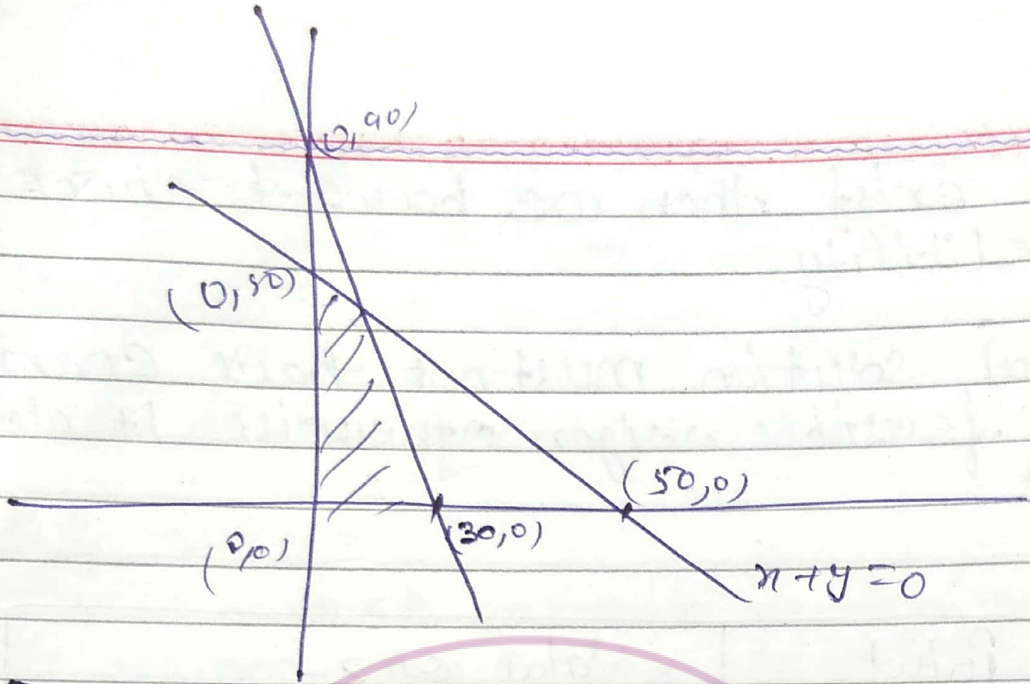
$x + y \le 50$

$3x + y \le 90$

$x \ge 0$

$y \ge 0$





	V. of Z
0,0	0
(30,0)	120 — max optima sol
(20,30)	110
(0,50)	50

Que: Solve the following linear Programming Problem minimize $z = 200x + 500y$

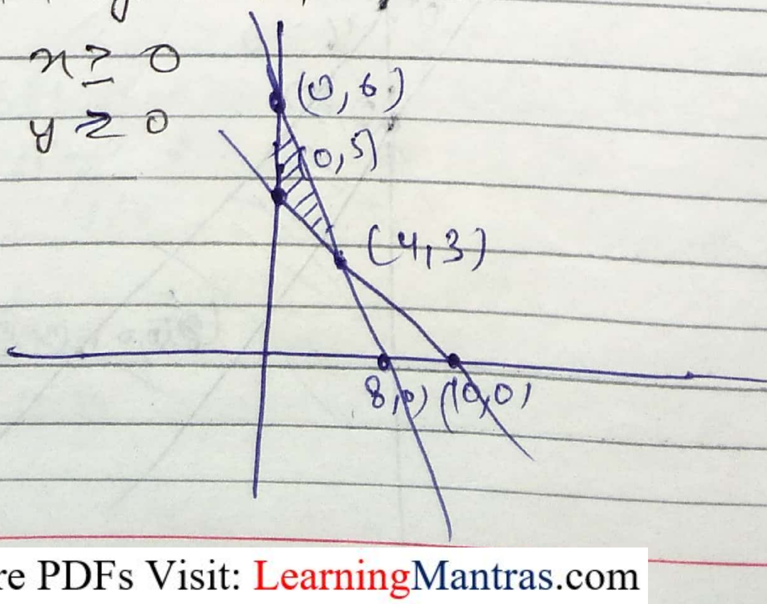
Subject to constraints

$x + 2y \geq 10$

$3x + 4y \leq 24$

$x \geq 0$

$y \geq 0$



Corner Points	Value of z
(0,5)	2500
(4,3)	2300
(0,6)	3000

Q. $z = 3x + 9y$

constraints

$x + 3y \le 60$

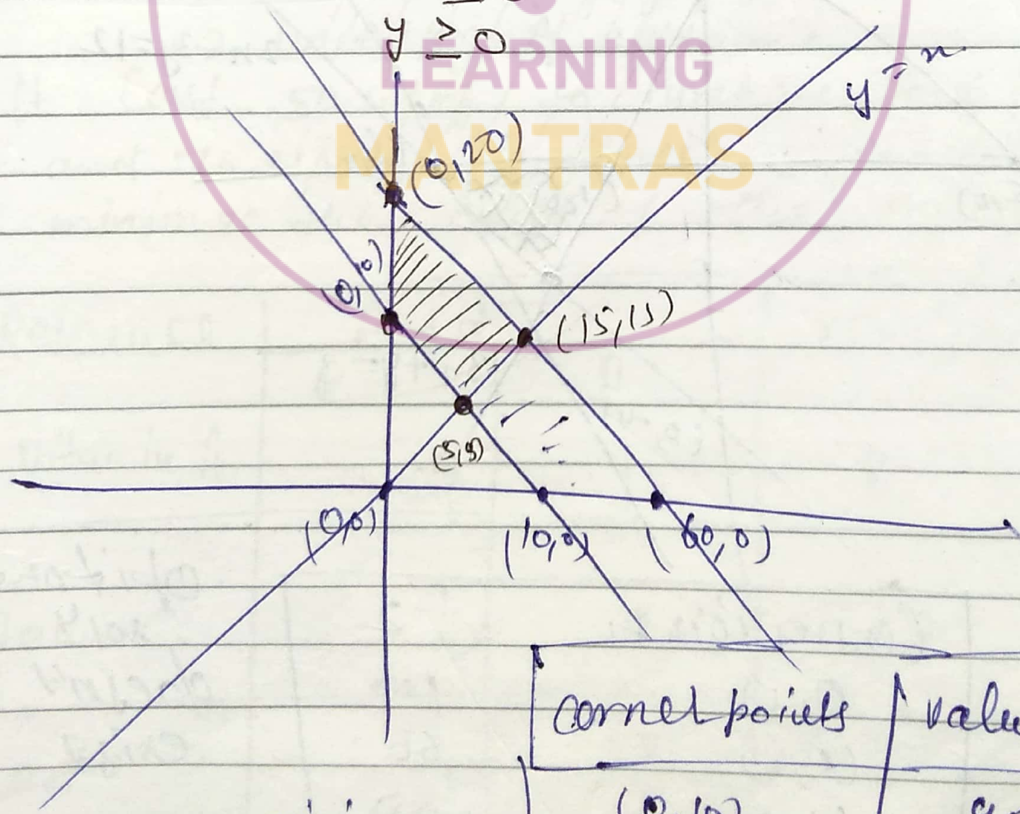
$x + y \ge 10$

$x \le y$

$x \ge 0$

$y \ge 0$

maximize and minimum



corner points	value of z
(0,10)	90
(5,5)	60
(15,15)	180
(0,20)	180

minimum

maximum

Q. $z = -50x + 20y$

minimize

Subject to Constraints

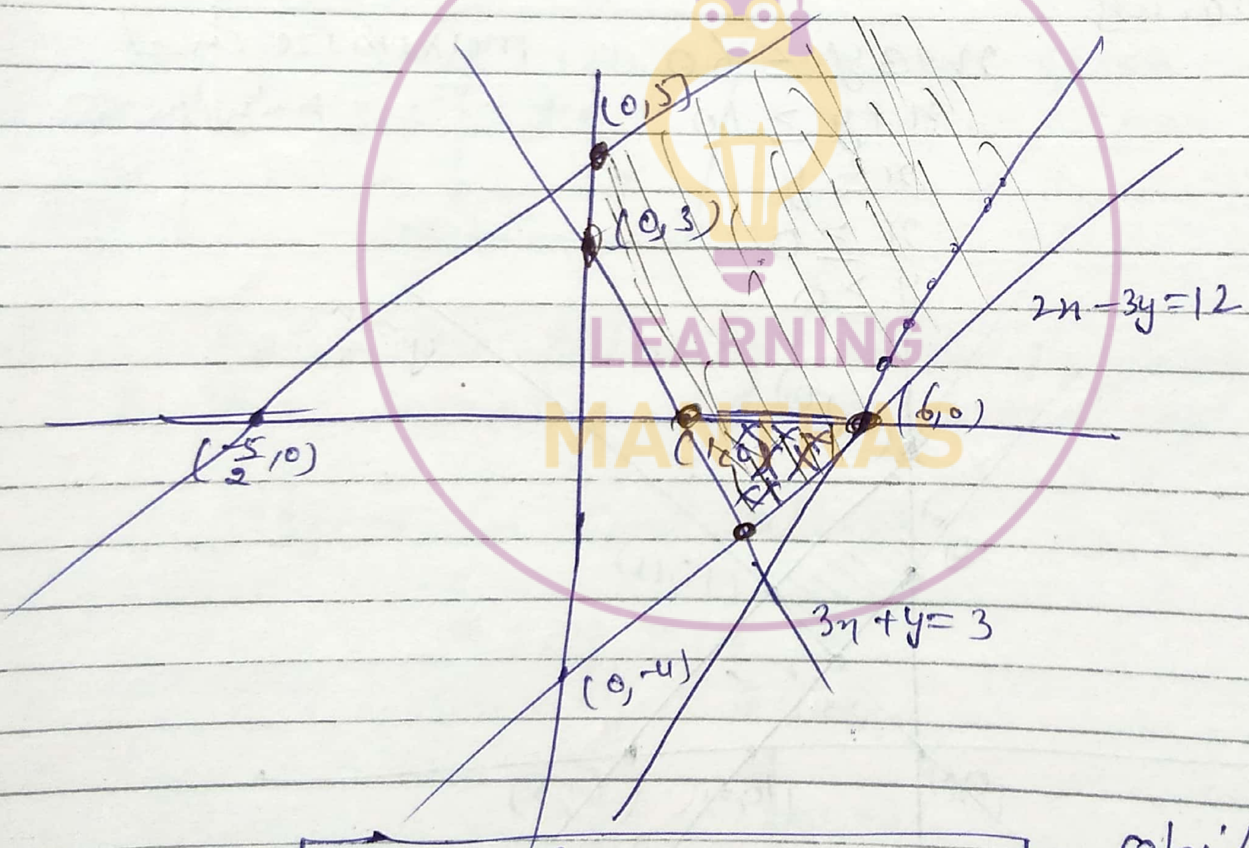
$2x - y \geq -5$

$3x + y \geq 3$

$2x - 3y \leq 12$

$x \geq 0$

$y \geq 0$



Corner Points	z
(0,5)	100
(0,3)	60
(1,0)	-50
(6,0)	-300

Optional sol^n doesn't exist

(5.4) 6 Rs Fre

$$Z = -300$$
$$-50x + 20y = -300$$
$$-5x + 2y = -30$$

$$5x - 2y = 30$$

☆☆
Que:- A ditatian which mixed in such a way that Vitamin contents of the mixture contents at least 8 unit of Vitamin A and 10 unit of Vitamin C. food I contains 2 unit/kg of Vitamin A and 1 unit/kg of Vitamin C.

food II contain 1 unit/kg of Vitamin A and 2 unit/kg of Vitamin B
It cost 50 Rs/kg to Purchase food I and 70 Rs/kg to Purchase food II minimize the cost of the mixture

Resource	Food I	Food II	requirement
Vitamin A	2	1	8
Vitamin C	1	2	10
Cost	50	70	

food I
food II

$2x + y \geq 8$

$x + 2y \geq 10$

Cost $= z = 50x + 70y$

$x \geq 0$

$y \geq 0$

Ans:- 380