Related Problems with Solutions

Problem 1:

Question 4:

A manufacturer produces nuts ad bolts. It takes 1 hour of work on machine A and 3 hours on machine B to produce a package of nuts. It takes 3 hours on machine A and 1 hour on machine B to produce a package of bolts. He earns a profit, of Rs 17.50 per package on nuts and Rs. 7.00 per package on bolts. How many packages of each should be produced each day so as to maximize his profit, if he operates his machines for at the most 12 hours a day?

Answer

Let the manufacturer produce x packages of nuts and y packages of bolts. Therefore,

$x \geq 0$ and $y \geq 0$

The given information can be compiled in a table as follows.

	Nuts	Bolts	Availability
Machine A (h)	1	3	12
Machine B (h)	3	1	12

The profit on a package of nuts is Rs 17.50 and on a package of bolts is Rs 7. Therefore, the constraints are

$x+3y \leq 12$

$3x+y \leq 12$

Total profit, $Z = 17.5x + 7y$

The mathematical formulation of the given problem is

Maximise $Z = 17.5x + 7y$ ... (1)

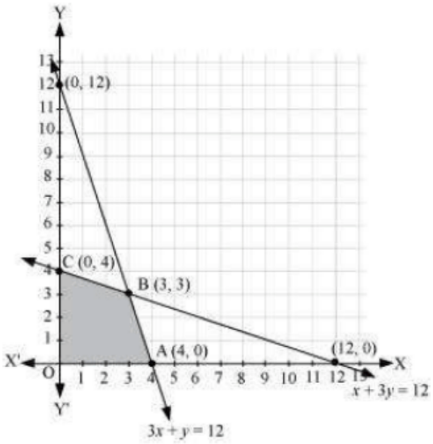
subject to the constraints,

$x + 3y \leq 12$ ... (2)

$3x + y \leq 12$ ... (3)

$x, y \geq 0$ ... (4)

The feasible region determined by the system of constraints is as follows.



The corner points are A (4, 0), B (3, 3), and C (0, 4).

The values of Z at these corner points are as follows.

Corner point	**$Z = 17.5x + 7y$**	
O(0, 0)	0	
A(4, 0)	70	
B(3, 3)	73.5	→ Maximum
C(0, 4)	28	

The maximum value of Z is Rs 73.50 at (3, 3).

Thus, 3 packages of nuts and 3 packages of bolts should be produced each day to get the maximum profit of Rs 73.50.