NCERT Exemplar Solutions
Class 12 – Mathematics
Chapter 12 – Linear Programming

Objective Type Questions

Question 26 The corner points of the feasible region determined by the system of linear constraints are (0, 0), (0, 40), (20, 40), (60, 20), (60, 0). The objective function is $Z = 4x + 3y$. Compare the quantity in column *A* and column *B.*

Column A	Column B
Maximum of *Z*	325

(a) The quantity in column A. is greater

(b) The quantity in column B is greater

(c) The two quantities are equal

(d) The relationship cannot be determined on the basis of the information supplied.

Solution. (b)

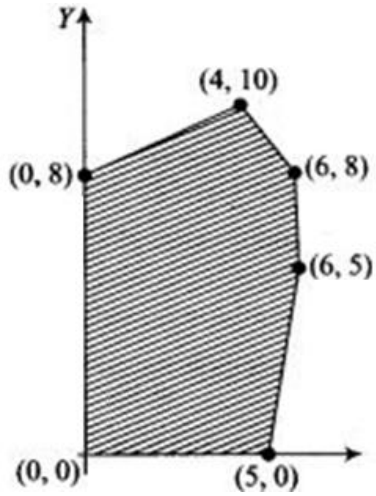
Explanation:

Corner points	Corresponding value of $Z = 4x + 3y$
(0, 0)	0
(0, 40)	120
(20, 40)	200
(60. 20)	300 (Maximum)
(60, 0)	240

Hence, maximum value of $Z = 300 < 325$

So, the quantity in column B is greater,

Question 27 The feasible solution for a LPP is shown in following figure. Let $Z = 3x – 4y$ be the objective function. Minimum of Z occurs at



(a) (0, 0) (b) (0, 8)

(c) (5, 0) (d) (4, 10)

Solution. (b)

Explanation:

Corner points	Corresponding value of $Z = 3x - 4y$
(0,0)	0
(5,0)	15 –2
(6, 5)	–14
(6,8)	–28
(4,10)	–32(Minimum)
(0 8)	

Hence, the minimum of Z occurs at (0, 8) and its minimum value is (-32).

Question 28 Refer to question 27. Maximum of Z occurs at

(a) (5,0) (b) (6, 5)

(c) (6,8) (d) (4, 10)

Solution. (a)

Explanation:

Corner points	Corresponding value of $Z = 3x - 4y$

(0,0)	0
(5,0)	15 (Maximum)
(6, 5)	–2
(6,8)	–14
(4,10)	–28
(0 8)	–32

Hence, maximum of Z occurs at (5, 0) and its maximum value is 27.

Question 29 Refer to question 7, maximum value of Z + minimum value of Z is equal to

(a) 13 (b) 1

(c) –13 (d) –17

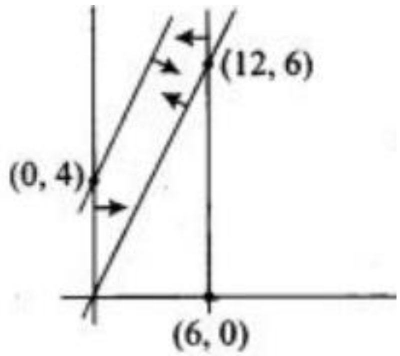
Solution. (d)

Explanation:

Corner points	Corresponding value of $Z = 3x - 4y$
(0,0)	0
(5,0)	15 (Maximum)
(6, 5)	–2
(6,8)	–14
(4,10)	–28
(0 8)	–32(Minimum)

Here, maximum value of Z + minimum value of Z = 15 – 32 = – 17

Question 30 The feasible region for an LPP is shown in the following figure. Let $F = 3x - 4y$ be the objective function. Maximum value of F is



(a) 0 (b) 8

(c) 12 (d) –18

Solution. (c)

Explanation: The feasible region as shown in the figure, has objective function $F = 3x - 4y$.

Corner points	Corresponding value of $F = 3x - 4y$
(0,0)	0
(12,6)	12 (Maximum)
(0,4)	–16 (Minimum)

Hence, the maximum value of F is 12.

Question 31 Refer to question 30. Minimum value of F is

(a) 0 (b) –1 6

(c) 12 (d) Does not exist

Solution. (b)

Explanation: Referring to solution of question 30, we have minimum value of F is –16at (0, 4).

Question 32 Corner points of the feasible region for an LPP are (0, 2), (3, 0), (6, 0), (6, 8) and (0, 5). Let $F = 4x + 6y$ be the objective function. The minimum value of F occurs at

(a) Only (0,2)

(b) Only (3, 0)

(c) the mid-point of the line segment joining the points (0, 2) and (3, 0)

(d) any point on the line segment joining the points (0, 2) and (3, 0)

Solution. (d)

Explanation:

Corner points	Corresponding value of $F = 4x + 6y$
(0,2)	12 (Minimum)
(3,0)	12 (Minimum)
(6,0)	24
(6,8)	72 (Maximum)
(0,5)	30

Hence, minimum value of F occurs at any points on the line segment joining the points (0, 2) and (3, 0).

Question 33 Refer to question 32, maximum of F- minimum of F is equal to

(a) 60 (b) 48

(c) 42 (d) 18

Solution. (a)

Explanation: Referring to the solution of question 32,

Maximum of F - Minimum of F = 72 – 12 = 60

Question 34 Corner points of the feasible region determined by the system of linear constraints are (0, 3), (1, 1) and (3, 0). Let Z = $px + qy$, where $p\ q > 0$. Condition on p and q, so that the minimum of Z occurs at (3, 0) and (1, 1) is

(a) $p = 2q$ (b) $\text{p} = \frac{q}{2}$

(c) $P = 3q$ (d) $p = q$

Solution. (b)

Corner points	Corresponding value of Z = $px + qy$; $p, q > 0$
(0,3)	$3q$
(1,1)	$p + q$
(3,0)	$3p$

So, condition of p and q, so that the minimum of Z occurs at (3, 0) and (1, 1) is

$$p + q = 3p$$

$$\Rightarrow \quad 2p = q$$

$$\Rightarrow \quad p = \frac{q}{2}$$