BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

Date: 23/11/2021

Subject: Mathematics

Topic : Linear Programming   Class: Standard XII

1. For an LPP,
   maximize $z = ax + by$ where $a, b \in R$ subject to the constraints
   $a_1x + b_1y \leq 0$
   $a_2x + b_2y \leq 0$
   $x, y \geq 0,$
   consider the following statements:
   (I) The solution depends on the optimizing function.
   (II) The solution depends on the constraints.

   Which of the following statement(s) is/are correct?

   A. Both (I) and (II)

   B. (I) only

   C. (II) only

   D. The solution depends upon some more aspects.

2. The corner points of the feasible region determined by a system of linear constraints are $(0, 10), (5, 5), (15, 15), (0, 20)$. Let $z = px + qy$ where $p, q > 0$. If the maximum of z occurs at both the points $(15, 15)$ and $(0, 20)$, then which of the following is true:

   A. $p = q$

   B. $p = 2q$

   C. $p = 3q$

   D. $q = 3p$

3. If $Z = 3x + 4y$, subject to the constraints: $x + y \leq 4$, $x \geq 0$, $y \geq 0$, then $Z_{\max}$ is equal to

   A. 12

   B. 16

   C. 20

   D. 24

4. A toy company manufactures two types of dolls, A and B. Market tests and available resources have indicated that the combined production level should not exceed 1200 dolls per week and the demand for dolls of type B is at most half of that for dolls of type A. Further, the production level of dolls of type A can exceed three times the production of dolls of other types by at most 600 units. If the company makes a profit of $Rs.12$ and $Rs.16$ per doll respectively on dolls A and B, how many of each should be produced weekly in order to maximize the profit

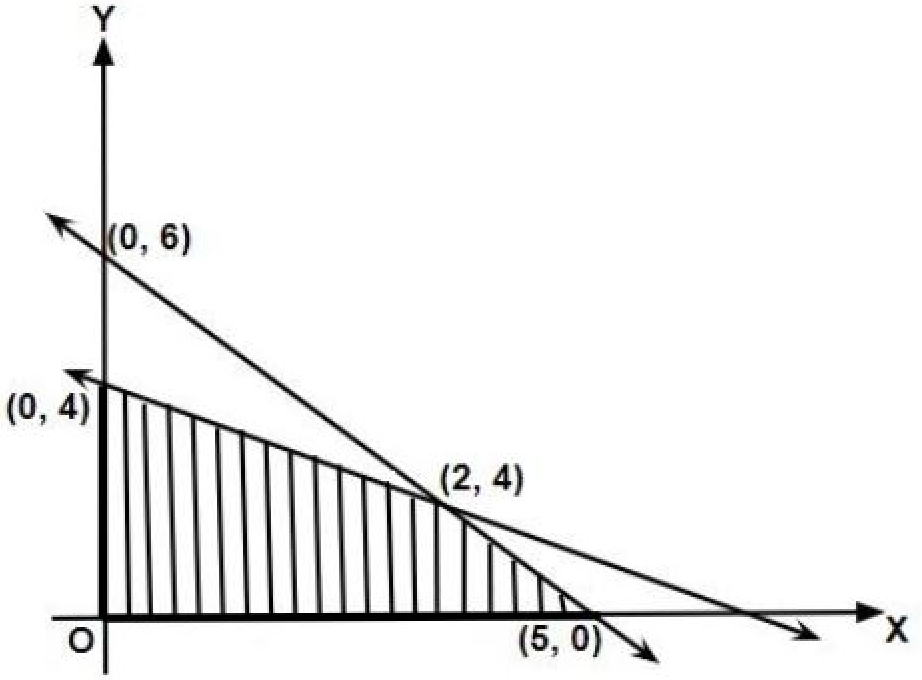
   A. $(A, B) \equiv (400, 800)$

   B. $(A, B) \equiv (800, 400)$

   C. $(A, B) \equiv (600, 600)$

   D. $(A, B) \equiv (0, 1200)$

5. The feasible region of a LPP is shown in the figure. If $Z = 5x + 2y$, then the maximum value of Z occurs at



A. $(0, 0)$

B. $(5, 0)$

C. $(2, 4)$

D. $(0, 4)$

6. If $Z = 5x + 3y$, subject to $3x + 5y \leq 15, 5x + 2y \leq 10, x \geq 0, y \geq 0$, then $Z_{\max}$ is equal to

A. 10

B. 9

C. $\frac{235}{19}$

D. $\frac{255}{19}$

7. If $Z = x + 2y$, subject to the constraints: $2x + y \geq 3,\ x + 2y \geq 6,\ x,\ y \geq 0$, then the minimum of Z occurs at

A. only one point

B. two points

C. more than two points

D. minimum of Z is not possible

8. The point which lies in the half plane $3x - 2y - 2 \geq 0$ is

A. $(-3, -1)$

B. $(2, 3)$

C. $(3, 2)$

D. $(1, 3)$

9. An aeroplane can carry a maximum of 200 passengers. A profit of Rs 1000 is made on each executive class ticket and a profit of Rs 600 is made on each economy class ticket. The airline reserves at least 20 seats for executive class and 80 for economy class, then the number of tickets of each class must be sold in order to maximise the profit for the airline is [where $n(E) =$ number of executive class tickets and $n(E') =$ number of economy class tickets]

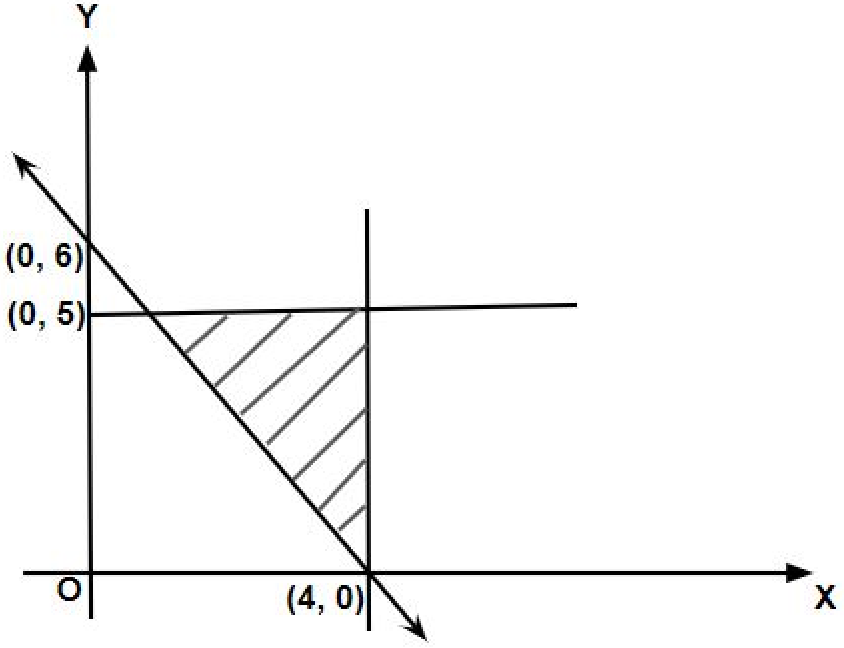
A. $n(E) = 120,\ n(E') = 80$

B. $n(E) = 80,\ n(E') = 120$

C. $n(E) = 140,\ n(E') = 60$

D. $n(E) = 60,\ n(E') = 140$

10. The shaded region in the figure is the solution set of the inequations



A. $6x + 4y \geq 24,\ x \leq 4,\ y \leq 5,\ x, y \geq 0$

B. $6x + 4y \leq 24,\ x \geq 4,\ y \leq 5,\ x, y \geq 0$

C. $6x + 4y \leq 24,\ x \geq 4,\ y \geq 5,\ x, y \geq 0$

D. $6x + 4y \geq 24,\ x \geq 4,\ y \leq 5,\ x, y \geq 0$

11. Sum of maximum and minimum value of the objective function $z = 10x + 7y$, subjected to the constraints $0 \leq x \leq 60,\ 0 \leq y \leq 45,\ 5x + 6y \leq 420$ is

A. 740

B. 1025

C. 1055

D. 1100

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12. Minimum value of objective function $z = 2.5x + y$ subject to the constraints: $x \geq 0,\ y \geq 0,\ 3x + 5y \leq 15,\ 5x + 2y \leq 10$ is

   A. 20

   B. 5

   C. 0

   D. Does not exist

13. A manufacturer has employed 5 skilled men and 10 semi-skilled men and makes two models A and B of an article. The making of one item of model A requires 2 hours work by a skilled men and 2 hours work by a semi-skilled man. One item of model B requires 1 hour by a skilled man and 3 hours by a semi-skilled man. No man is expected to work more than 8 hours per day. The manufacturer's profit on an item of model A is Rs.15 and on an item of model B is Rs.10, then the total number of items of each model should be made per day in order to maximize daily profit.
   $[$where, $n(A) =$ number of items of artical A and $n(B) =$ number of items of artical $A]$

   A. $n(A) = 10,\ n(B) = 15$

   B. $n(A) = 15,\ n(B) = 10$

   C. $n(A) = 10,\ n(B) = 20$

   D. $n(A) = 20,\ n(B) = 10$

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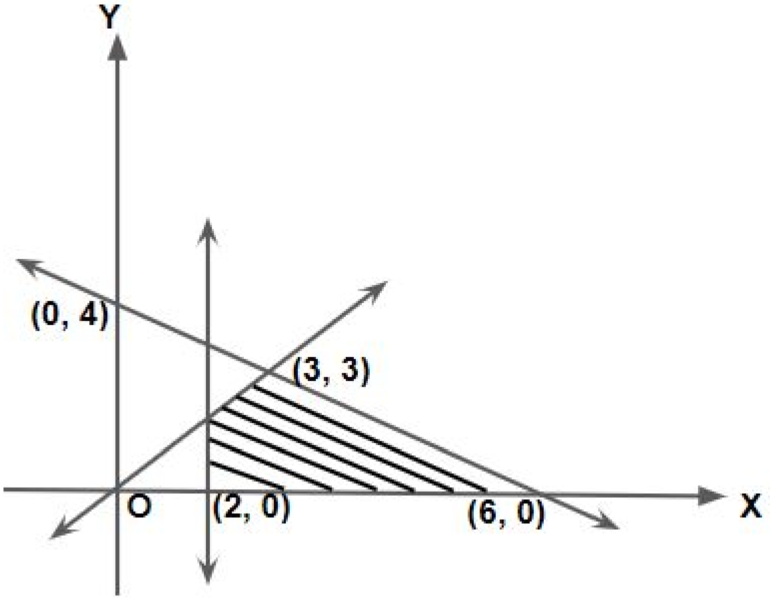
14. The shaded region in the figure is the solution set of the inequations.



A. $4x + 6y \leq 24,\ x \leq 2,\ y \leq x,\ x,\ y \geq 0$

B. $4x + 6y \leq 24,\ x \geq 2,\ y \geq x,\ x,\ y \geq 0$

C. $4x + 6y \geq 24,\ x \leq 2,\ y \geq x,\ x,\ y \geq 0$

D. $4x + 6y \leq 24,\ x \geq 2,\ y \leq x,\ x,\ y \geq 0$

15. For the LPP; maximize $z = 5x - 2y$ subject to the constraints
$3x + 2y \leq 6,\ 10x + 9y \geq 45,\ x, y \geq 0$

A. $z_{\min} = -15$

B. $z_{\min} = 0$

C. $z_{\min} = -6$

D. The LPP has no feasible solution.

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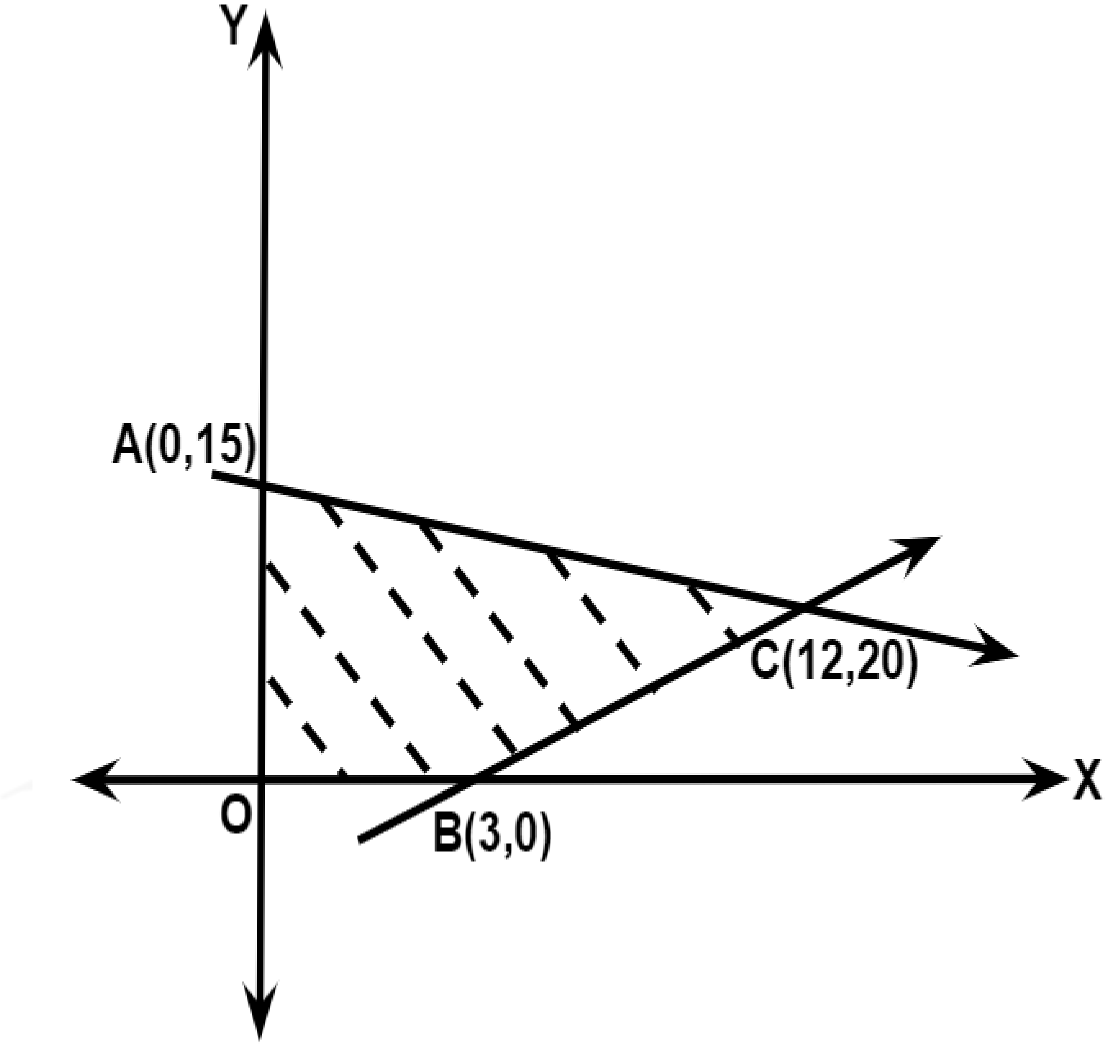
16. The feasible region of a LPP is shown in the figure. If $Z = 3x - y$, then the maximum value of Z occurs at



A. $(0, 0)$

B. $(3, 0)$

C. $(12, 20)$

D. $(0, 15)$

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17. A fruit grower has 150 acres of land available to raise two crops, A and B. It takes one day to trim an acre of crop A and two days to trim an acre of crop B and there are 240 days per year available for trimming. It takes 0.3 day to pick an acre of crop A and 0.1 day to pick an acre of crop B and there are 30 days per year available for picking. The number of acres of each fruit that should be planted to maximize profit, assuming that the profit is 140 per acre for crop A and 235 per acre for crop B, is

    A. 29820

    B. 35250

    C. 29550

    D. 25640

18. The corner points of the feasible region for optimization problem determined by a system of linear constraints are $(6,5),(9,7),(15,0),(0,10)$. Let $z=px+qy$ and the maximum of z occurs at both the points $(6,5)$ and $(9,7)$, then which of the following is true:

    A. $3p+2q=0$ and $p>0, q>0$

    B. $3p+2q=0$ and $p>0, q<0$

    C. $3p+2q=0$ and $p<0, q<0$

    D. $3p+2q=0$ and $p<0, q>0$

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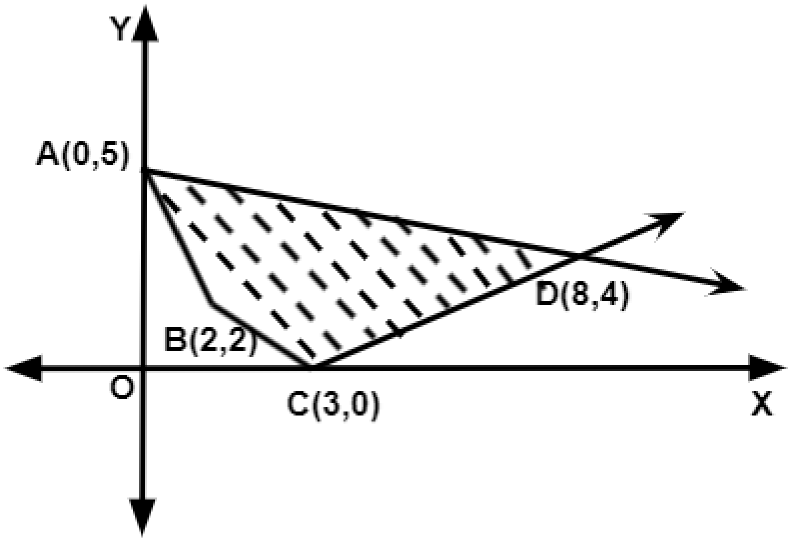
19. The feasible region of an LPP is shown in the figure. If $Z = 8x + 3y$, then the minimum value of Z occurs at



A. $(2, 2)$

B. $(3, 0)$

C. $(0, 5)$

D. $(8, 4)$

20. A vanilla cake requires $200\mathrm{g}$ of flour and $25\mathrm{g}$ of fat, and a strawberry cake requires $100\mathrm{g}$ of flour and $50\mathrm{g}$ of fat. From $5\mathrm{kg}$ of flour and $1\mathrm{kg}$ of fat, the maximum number of cakes that can be made is

A. 45

B. 30

C. 25

D. 20