Class 12 Mathematics · Chapter 12: Linear Programming

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. On a bounded feasible region, Z = ax + by takes its maximum value 48 at both corner points P(2, 8) and Q(6, 4). Which of the following is true? [1]

(a) Z takes the value 48 only at P and Q

(b) the maximum value of Z is 96, the sum of the values at P and Q

(c) Z also takes the value 48 at (4, 6)

(d) Z has no maximum value, since two corner points give it

2. In a linear programming problem with decision variables x and y, which of the following is a non-negative restriction? [1]

(a) $x + y \le 12$

(b) $x - 2y \ge 0$

(c) $Z = 5x + 3y$

(d) $y \ge 0$

3. The corner points of a bounded feasible region are (0, 0), (6, 0), (4, 3) and (0, 5). The maximum value of Z = 2x + 5y on the region is [1]

(a) 23

(b) 12

(c) 25

(d) 37

4. The feasible region of a system of linear inequalities is said to be bounded if [1]

(a) it can be enclosed within a circle

(b) it contains the origin

(c) it has at most four corner points

(d) it lies in the first quadrant

5. For $x \ge 0$, $y \ge 0$, the constraints $2x + 3y \le 6$ and $x + y \ge k$ have no feasible region exactly when [1]

(a) $k > 2$

(b) $k > 3$

(c) $k < 3$

(d) $k > 6$

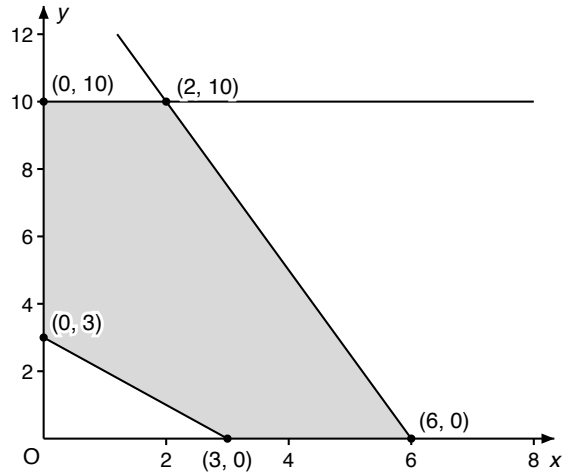
6. The corner points of a bounded feasible region are A(2, 0), B(6, 0), C(5, 4) and D(1, 3). Find the maximum and minimum values of Z = 3x − 4y, and the points at which they occur. [2]

7. The corner points of a bounded feasible region are (0, 0), (6, 0), (4, 4) and (0, 5). The maximum of Z = px + 3y on the region occurs at both (6, 0) and (4, 4). Find p and the maximum value of Z. [2]

8. The feasible region given by $x + y \ge 5$, $3x + y \ge 9$, $x \ge 0$, $y \ge 0$ is unbounded, with corner points (0, 9), (2, 3) and (5, 0). The smallest value of Z = 4x + 3y at these corners is 17, at (2, 3). Show that 17 is the minimum value of Z on the region. [2]

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9. The shaded region in the figure, with its boundary, is the feasible region of a linear programming problem. (a) Write the constraints that define it. (b) Find the maximum and minimum values of Z = 4x + y on it. [3]



10. The feasible region of a linear programming problem is given by $x + y \le 7$, $2x - y \ge 0$, $x \le 4$, $x \ge 0$, $y \ge 0$. [3] (a) Find all values of a for which the point (a, 2) is a feasible solution. (b) Among these points, find the one at which Z = 3x + y is largest, and that value of Z.

11. Kabir has at most 3 hours a day for exercise. He walks for x hours and cycles for y hours, and on his doctor's advice cycles for no longer than he walks. Walking burns 300 kcal an hour and cycling 500 kcal an hour. Formulate a linear programming problem to maximise the energy he burns, and solve it graphically. [3]

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