MATHS

BOOKS - MODERN PUBLICATION

LINEAR PROGRAMMING

Example

1. Draw the graph of the following LPP: $5x + 2y \leq 10, x \geq 0, y \geq 0.$

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2. Solve the following systems of inequations graphically :

$x + 2y \leq 8, 2x + y \leq 8, x \geq 0, y \geq 0.$

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3. Find the linear constraints for which the shaded area in the figure below is the solution set.

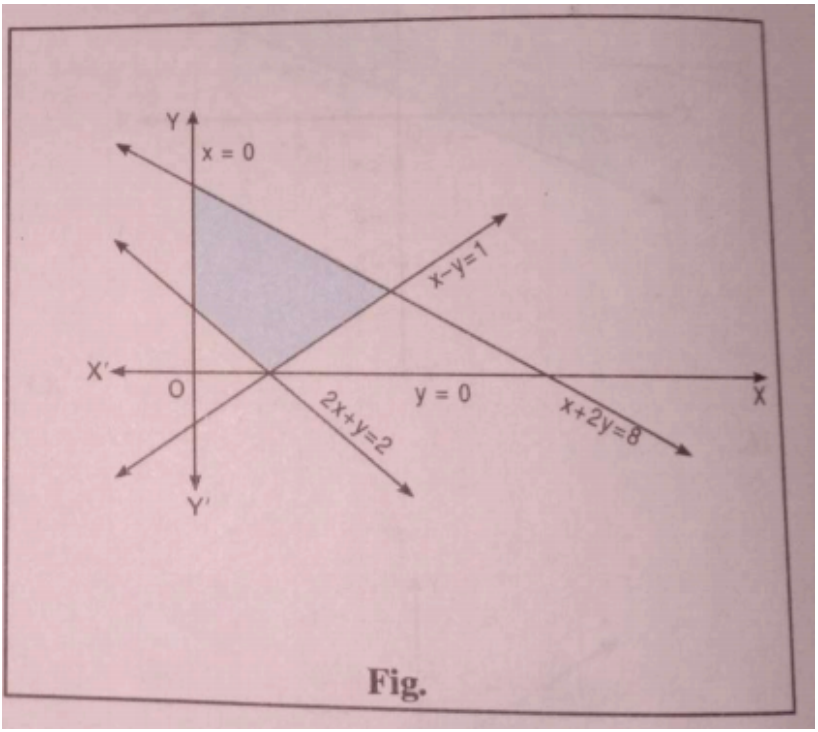

Fig.

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4. A furniture dealer deals in only two items tables chairs. He has Rs 5000 to invest and a space to store at most 60 pieces. A table costs him Rs 250 and a chair Rs 50. He can sell a table at a profit of Rs 50 and a chair at a

profit of Rs 15. Assuming that he can sell all the items that he buys, how should he invest his money in order that he may maximize his profit?

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5. Priya bought a pen for Rs 25 . 65 .He gave Rs 50 to the shopkeeper. How much money did he get back from the shopkeeper?

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6. Maximize $Z = 5x + 3y$ subject to the constraints : $2x + y \leq 8, x + 2y \leq 12, x \geq 0, y \geq 0$ using graph.

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7. Find x and y : 9x+2y=20, x-2y=0.

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8. Graphically minimize and maximize $z = 5x + 10y$ subject to the constraints: $x + 2y \leq 120, x + y \leq 60, x - 2y \geq 0x, y \geq 0.$

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9. Minimise $Z = 3x + 2y$ subject to the constraints: $x + y \geq 8, 3x + 5y \leq 15, x \geq 0, y \geq 0$

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10. Determine graphically the minimum value of the objective function $Z = -50x + 20y$ subject to the constraints: $2x - y \geq -5, 3x + y \geq 3, 2x - 3y \leq 12, x \geq 0, y \geq 0$

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11. Graphically maximize Z = 5x + 2y subject to the constraints :

$x - 2y \leq 2, 3x + 2y \leq 12, \ -3x + 2y \leq 3, x \geq 0, y \geq 0$

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12. A dealer in rural area wishes to purchase a number of sewing machines. He has only Rs 5670 to invest and has a space for at most 20 items. An electronic sewing machine costs him Rs 360 and manually operated sewing machine Rs 240. He can sell electronic sewing machine at a profit of Rs 22 and a manually operated sewing machine at a profit of Rs 18. Assumning that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit. Make it a linear programming problem and solve it graphically. Keeping the rural background in mind justify the values to be promoted for the selection of the manually operated machine.

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13. If a man rides his motor cycle at 25 km/hr, he has to spend Rs 2 per km on petrol, if he rides at a faster speed of 40 km/hr, the petrol cost increases to Rs 5 perkm. He has Rs 100 to spend on petrol and wishes to find maximum distance he can travel within one hour. Express this as a linear programming problem and then solve it graphically.

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14. Every gram of wheat provides 0.1 g of protien and 0.25 g of carbohydrates. The corresponding values for rice are 0.05 g and 0.5 g respectively. Wheat costs Rs 4 per kg and rice Rs 6 per kg. The minimum daily requirements of protien and carbohydrates for an average child are 50 g and 200 g respectively. In what quantities should wheat and rice be mixed in the daily diet so as to provide the maximum daily requirements of protien and carbohydrates at minimum cost? Frame a LPP and solve it graphically.

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15. A small firm manufactures gold rings and chains. The total number of rings and chains manufactured per day is almost 24. it takes 1 hour to make a ring and 30 minutes to make a chain. The maximum number of hours available per day is 16. If the profit on a ring is ₹ 300 and that on a chain is ₹ 190, find the number of rings and chains that should be manufactured per day, so as to earn the maximum profit. Makes it is an L.P.P and solve it graphically.

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16. A manufacturer produces two products A and B. Both the products are processed on two different machines. The available capacity of first machine is 12 hours and that of second machine is 9 hours per day. Each unit of product A requires 3 hours on both machines and each unit of product B requires 2 hours on first machine and 1 hour on secnd machine. Each unit of product A is sold at Rs 7 profit and that of B at a profit of Rs 4. Find the production level per day for maximum profit graphically.

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17. A factory manufactures two types of screws, A and B. Each type of screw requires the use of two machines, an automatic and a hand operated. It takes 4 minutes on the automatic and 6 minutes on hand operated machines to manufacture a package of screws A, while it takes 6 minutes on automatic and 3 minutes on the hand operated machines to manufacture a package of screws B. Each machine is available for at the most 4 hours on any day. The manufacturer can sell a package of screws A at a profit of Rs 7 and screws B at a profit of Rs 10. Assuming that he can sell all the screws he manufactures, how many packages of each type should the factory owner produce in a day in order to maximise his profit? Determine the maximum profit

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18. Two tailors A and B earn Rs 150 and Rs 200 per day respectively. A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day. How many days shall each work it it is desired to produce (at least)

60 shirts ands 32 pants at a minimum labour cost? Solve the problem graphically.

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19. A farmer has a supply of chemical fertilizer of type A which contains 10 % nitrogen and 6% phosphoric acis and type B fertilizer which contains 5% nitrogen and 10% phosphoric acid. After testing the soil condition of a field, it is found that at least 14 kg of nitrogen and 14 kg of phosphoric acid are required for a good crop. The fertilizer type A costs Rs 5 per kg and type B Rs 3 per kg. How many kilograms of each fertilizer should be used to meet the requirements and the cost be minimum? Using LPP, solve the above problem graphically.

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20. A furniture firm manufactues chairs and tables, each requairing the use of three machines A,B and C. Producing of 1 chair requires 2 hours of machine A, 1hour on machine B and 1 hour on machine C. Each table

requires 1 hour each on machine A and B and 3 hours on machine C. The profit realised by selling 1 chair is Rs 30 while for a table is Rs 60. The total time available per week on machine A is 70 hours , on machine B is 40 hours and on machine C is 90 hours. Find the mathematical formulation so as to find the number of chairs and tables that should be made per week soto maximizethe profit.

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21. A manufacturer considers that men and women are equally efficient and so he pays them at the same rate. He has 30 and 27 units of workers (male and female) and capital respectively, which he uses to produce two types of goods A and B. To produce one unit of A 2 workers and 3 units of capital are required while 3 workers and 1 unit of capital are required to produce one unit of B. If A and B are priced at Rs 100 and Rs 120 per unit respectively, how should he use his resources to maximise the total revenue? From the above as as LPP and solve graphically. Do you agree with this view of the manufacturer that men and women are equally efficient and so should be paid at the same rate?

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22. A cooperative society of farmers has 50 hectare of land to grow two crops X and Y. The profit from crops X and Y per hectare are estimated as Rs 10,500 and Rs 9,000 respectively. To control weeds, a liquid herbicide has to be used for crops X and Y at rates of 20 litres and 10 litres per hectare. Further, no more than 800 litres of herbicide should be used in order to protect fish and wild life using a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximise the total profit of the society?

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23. A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two food F1 and F2 are available. Food F1 costs Rs. 4 per unit food and F2 costs Rs. 6 per unit. One unit of food F1 contains 3 units of vitamin A and 4 units of minerals. One unit of food F2 contains 6 units of vitamin A and 3 units of minerals. Formulate this-as linear programming

problem. Find the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.

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24. A farmer has a supply of chemical fertilizer of type A which contains 10 % nitrogen and 6% phosphoric acis and type B fertilizer which contains 5% nitrogen and 10% phosphoric acid. After testing the soil condition of a field, it is found that at least 14 kg of nitrogen and 14 kg of phosphoric acid are required for a good crop. The fertilizer type A costs Rs 5 per kg and type B Rs 3 per kg. How many kilograms of each fertilizer should be used to meet the requirements and the cost be minimum? Using LPP, solve the above problem graphically.

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25. An oil company requires 13000, 20000 and 15000 barrels of high grade, medium grade and low grade oil respectively, Refinery A produces 100, 300 and 200 barrels per day of high, medium and low grade oil

respectively whereas refinery B produces 200, 400 and 100 barrels per day respectively. If A costs Rs 400 per day and B costs Rs 300 per day to operate, how many days should each be run to minimise the cost of requirement?

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26. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs 50 per kg to purchase Food 'I' and Rs 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture.

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27. A retired person wants to invest an amount of Rs 50000. His broker recommends investing in two types of bonds A and B yeilding 10% and

9% return respectively on the invested amount. He decides to invest at least Rs 20000 in bond A and at least Rs 10000 in bond B. He also wants to invest at least as much in bond A as in bond B. Slove this linear programming problem graphically to maximize his returns.

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28. In a triangle ABC, if a = 18, b = 24 and c = 30, find cos A, cos B and cos C.

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29. Determine the minimum value of $Z = 3x + 2y$ (if any) , if the feasible region for an LPP is ashown in the figure:

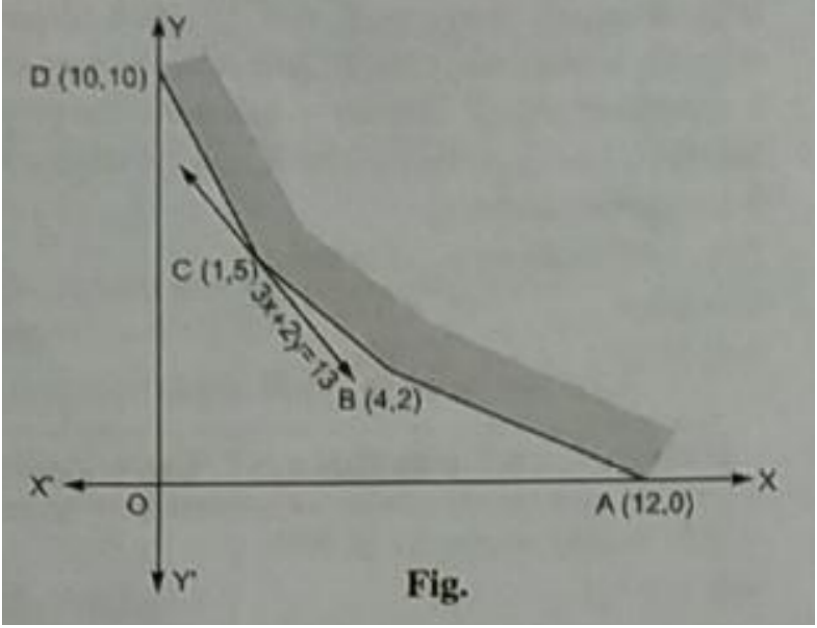

Fig.

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Exercise

1. Draw the graph of the following LPP: $3x + y \leq 17, x \geq 0, y \geq 0.$

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2. Find the solution set of the system of linear contraints : $x + y \leq 6, x \geq 1$ and $y < 1$ by graph.

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3. Solve the following systems of linear inequalities graphically

$3x + 4y \leq 60, x + 3y \leq 30, x \geq 0, y \geq 0.$

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4. Draw the diagrams of the solutions sets of the following linear constraints: $3x + 2y \leq 14, 3x + y \leq 9, x, y \geq 0$

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5. Draw the diagram of the solution sets of the following linear constraints :

$x + y \leq 5, 4x + y \geq 4, x + 5y \geq 5, x \leq 4, y \leq 3.$

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6. Verity that the solution set of the following constraints is empty : $3x + 4y \geq 12, x + 2y \leq 3, x \leq 3, x \geq 0, y \geq 1.$

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7. Verify that the solution set of the following linear constraints : $x - 2y \geq 0, 2x - y \leq -2$ is not empty and is unbounded.

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8. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of

vitamin C. It costs Rs 50 per kg to purchase Food 'I' and Rs 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture.

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9. Find the first and common difference of AP whose third term is 26 and 5th term is 34.

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10. A furniture firm manufactues chairs and tables, each requairing the use of three machines A,B and C. Producing of 1 chair requires 2 hours of machine A, 1hour on machine B and 1 hour on machine C. Each table requires 1 hour each on machine A and B and 3 hours on machine C. The profit realised by selling 1 chair is Rs 30 while for a table is Rs 60. The total time available per week on machine A is 70 hours , on machine B is 40 hours and on machine C is 90 hours. Find the mathematical

formulation so as to find the number of chairs and tables that should be made per week soto maximizethe profit.

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11. Maximize $Z = x + 2y$ subject to : $x + y \geq 5, x \geq 0, y \geq 0$

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12. Maximize $Z = 2x + 3y$ subject to : $x + 2y \leq 6, x \geq 4, y \geq 0$

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13. Maximize $Z = 4x + y$ subject to : $x + y \leq 50, x, y \geq 0$

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14. Maximize $Z = x + 2y$ subject to : $x + y \geq 5, x \geq 0, y \geq 0$

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15. Solve the following linear programming problems graphically

Minimise $z = 3x + 2y$ subject to $3x + y \geq 3, x + 2y \geq 6, x, y \geq 0$

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16. Solve the following LPP graphically : Maximize $Z = 10x + 7y$ subject to $3x + y \leq 9, 3x + 2y \leq 12, x \geq 0, y \geq 0$

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17. Solve the following LPP graphically : Maximize $Z = 4x + y$ subject to $x + y \leq 50, 3x + y \leq 90, x \geq 0, y \geq 0$

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18. Solve the following LPP graphically : Maximize $Z = 3x + 2y$ subject to $x + 2y \leq 10, 3x + y \leq 15, x \geq 0, y \geq 0$

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19. Solve the following LPP graphically : Maximize $Z = 13x + 3y$ subject to $x + y \leq 6, 3x + 2y \leq 15, x \geq 0, y \geq 0$

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20. Solve the following LPP graphically : Maximize $Z = 3x + 5y$ subject to $x + y \leq 2, x + 3y \geq 3, x \geq 0, y \geq 0$

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21. Solve the following LPP graphically : Maximize $Z = 4x + 7y$ subject to $x + 2y \leq 20, x + y \leq 15, x \geq 0, y \geq 0$

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22. Solve the following LPP graphically : Maximize $Z = -3x + 4y$ subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$

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23. Solve the following LPP graphically : Maximize $Z = 6x + 11y$ subject to $2x + y \leq 104, x + 2y \leq 76, x, y \geq 0$

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24. Solve the following LPP graphically : Maximize $Z = 4x + 5y$ subject to $2x + 3y \leq 6, 2x + y \leq 4, x \geq 0, y \geq 0$

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25. Solve the following LPP graphically : Maximize $Z = 7x + 4y$ subject to

$2x + y \leq 10, x + 2y \leq 12, x \geq 0, y \geq 0$

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26. Solve the following linear programming problem graphically: Minimise

$Z = 200x + 500y$ subject to the constraints:

$x + 2y \geq 10, 3x + 4y \leq 24, x \geq 0, y \geq 0$

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27. Solve the following Linear Programming Problem graphically: Minimise

$Z = x + 2y$ subject to : $2x + y \geq 3, x + 2y \geq 6, x, y \geq 0$

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28. Solve the following LPP graphically : Maximize $Z = -3x + 4y$ subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$

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29. Solve the following LPP graphically : Minimize $Z = 3x + 5y$ subject to $x + 3y \geq 3, x + y \geq 2, x, y \geq 0$

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30. Minimize $Z = 2x + 3y$ subject to $1 \leq x + 2y \leq 10, x, y \geq 0$

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31. Solve the following problem graphically: Minimise $Z = 3x + 9y$ subject to the constraints: $x + 3y \leq 60, x + y \geq 10, x \leq y, x \geq 0, y \geq 0$

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32. Solve the following LPP graphically : Minimize $Z = 5x + 10y$ subject to $x + y \geq 60, x + 2y \leq 120, x - 2y \geq 0, x, y \geq 0$

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33. Solve the following LPP graphically : Minimize $Z = 2x + 5y$ subject to $2x + 4y \leq 8, 3x + y \leq 6, x + y \leq 4, x \geq 0, y \geq 0$

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34. Solve the following linear programming problems graphically

Minimize $Z = 3x + 5y$ subject to constraints $-2x + y \leq 4, x + y \geq 3, x - 2y \leq 2, x, y \geq 0$

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35. Maximize, if possible, : $Z = 3x + 2y$ subject to

$x - y \leq 1, x + y \geq 3, x, y \geq 0$

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36. Maximise $Z = 3x + 4y$, subject to the constraints

$x + y \leq 4, x \geq 0, y \geq 0$

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37. Maximize $Z = -x + 2y$ subject to

$x \geq 3, x + y \geq 5, x + 2y \geq 6, y \geq 0$

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38. Maximise $Z = x + y,$ subject to

$x - y \leq -1, -x + y \leq 0, x, y \geq 0$

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39. Verify that the following problem has no feasible solution: Maximize $Z = 4x_1 + 2x_2$ subject to the constraints $2x_1 + 3x_2 \leq 18, x_1 + x_2 \geq 12, x_1, x_2 \geq 0$

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40. Solve the following problem graphically: Maximise $Z = 3x + 9y$ subject to the constraints: $x + 3y \leq 60, x + y \geq 10, x \leq y, x \geq 0, y \geq 0$

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41. Maximise $Z = 5x + 10y$ subject to: $x + 2y \leq 120, x + y \geq 60, x - 2y \geq 0, x, y \geq 0$

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42. Maximise $Z = x + 2y$ subject to:

$x + 2y \geq 100, 2x - y \leq 0, 2x + y \leq 200, x, y \geq 0$

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43. Maximize and Minimize : $Z = 3x + 9y$ subject to

$x + 3y \leq 60, x + y \geq 10x \leq y, x, y \geq 0$

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44. Consider the following LPP : Maximize $Z = 3x + 2y$ subject to

$x + 2y \leq 10, 3x + y \leq 15, x, y \geq 0$ Draw the feasible region.

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45. Solve the following LPP graphically : Maximize $Z = 3x + 2y$ subject to

$x + 2y \leq 10, 3x + y \leq 15, x \geq 0, y \geq 0$

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46. Solve the following LPP graphically : Maximize $Z = 3x + 2y$ subject to $x + 2y \leq 10, 3x + y \leq 15, x \geq 0, y \geq 0$

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47. One kind of cake requires 200g of flour and 25g of fat, and another kind of cake requires 100g of flour and 50g of fat. Find the maximum number of cakes which can be made from 5kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes.

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48. One kind of cake requires 300 gm of flour and 15 gm of fat and another kind of cake requires 150 gm of flour and 30 gm of fat. Find the

maximum number of cakes that can be made from 7.5 kg of flour and 600 gm of fat. Form a linear programming problem and solve it graphically.

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49. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs 50 per kg to purchase Food 'I' and Rs 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture.

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50. A factory makes tennis rackets and cricket bats. A tennis racket takes 1.5 hours of machine time and 3 hours of craftman's time in its making while a cricket bat takes 3 hour of machine time and 1 hour of craftman's time. In a day, the factory has the availability of not more than 42 hours

of machine time and 24 hours of craftsman's time. What number of rackets and bats must be made if the factory is to work at full capacity?

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51. A factory makes tennis rackets and cricket bats. A tennis racket takes 1.5 hours of machine time and 3 hours of craftman's time in its making while a cricket bat takes 3 hour of machine time and 1 hour of craftman's time. In a day, the factory has the availability of not more than 42 hours of machine time and 24 hours of craftsman's time. If the profit on a racket and on a bat is Rs 20 and Rs 10 respectively, find the maximum profit of the factory when it works at full capacity.

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52. A manufacturer produces nuts and 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 Rs17.50 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 maximise his profit, if he operates his machines for at the most 12 hours a day?

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53. A factory manufactures two types of screws, A and B. Each type of screw requires the use of two machines, an automatic and a hand operated. It takes 4 minutes on the automatic and 6 minutes on hand operated machines to manufacture a package of screws A, while it takes 6 minutes on automatic and 3 minutes on the hand operated machines to manufacture a package of screws B. Each machine is available for at the most 4 hours on any day. The manufacturer can sell a package of screws A at a profit of Rs 7 and screws B at a profit of Rs 10. Assuming that he can sell all the screws he manufactures, how many packages of each type should the factory owner produce in a day in order to maximise his profit? Determine the maximum profit

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54. A dealer in rural area wishes to purchase a number of sewing machines. He has only Rs 5670 to invest and has a space for at most 20 items. An electronic sewing machine costs him Rs 360 and manually operated sewing machine Rs 240. He can sell electronic sewing machine at a profit of Rs 22 and a manually operated sewing machine at a profit of Rs 18. Assumning that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit. Make it a linear programming problem and solve it graphically. Keeping the rural background in mind justify the values to be promoted for the selection of the manually operated machine.

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57. A man has Rs 1500 for the manufacture of rice and wheat. A bag of rice and a bag of wheat costs Rs 180 and Rs 120 respectively. He has storage capacity of 10 bags only. He earns a profit of Rs 11 and Rs 9 per bag of rice and wheat respectively. Formulate the problem as an LPP to find the

number of bags of each type he should buy to maximize the profit and solve it graphicly.

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58. A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of a grinding/cutting machine and a sprayer. It takes 2 hours on grinding/cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp. It takes 1 hour on the grinding/cutting machine and 2 hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding/cutting machine for at the most 12 hours. The profit from the sale of a lamp is Rs 5 and that from a shade is Rs 3. Assuming that the manufacturer can sell all the lamps and shades that he produces, how should he schedule his daily production in order to maximise his profit?

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59. A company manufactures two types of novelty souvenirs made of plywood. Souvenirs of type A require 5 minutes each for cutting and 10 minutes each for assembling. Souvenirs of type B require 8 minutes each for cutting and 8 minutes each for assembling. There are 3 hours 20 minutes available for cutting and 4 hours for assembling. The profit is Rs 5 each for type A and Rs 6 each for type B souvenirs. How many souvenirs of each type should the company manufacture in order to maximise the profit?

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60. A merchant plans to sell two types of personal computers – a desktop model and a portable model that will cost Rs 25000 and Rs 40000 respectively. He estimates that the total monthly demand of computers will not exceed 250 units. Determine the number of units of each type of computers which the merchant should stock to get maximum profit if he does not want to invest more than Rs 70 lakhs and if his profit on the desktop model is Rs 4500 and on portable model is Rs 5000.

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61. A manufacturing company makes two types of teaching aids A and B of Maths for class XII. Each type of A requires 9 labour hours for fabricating and 1 labour hour for fininshing. Each type of B requires 12 labour hours for fabricating and 3 labour hours for fininshing. For fabricating and finishing , the maximum labour hours available are 180 and 30 respectively. The company makes a profit of Rs 80 and each type of A and Rs 120 on each type of B. How many pieces of type A and type B should be manufactured per week to realise a maximum profit? What is the maximium profit per week?

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62. A manufacturing company makes two types of teaching aids A and B of Maths for class XII. Each type of A requires 9 labour hours for fabricating and 1 labour hour for fininshing. Each type of B requires 12 labour hours for fabricating and 3 labour hours for fininshing. For

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63. Two tailors A and B earn Rs 150 and Rs 200 per day respectively. A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day. How many days shall each work it it is desired to produce (at least) 60 shirts ands 32 pants at a minimum labour cost? Solve the problem graphically.

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64. A cooperative society of farmers has 50 hectare of land to grow two crops X and Y. The profit from crops X and Y per hectare are estimated as Rs 10,500 and Rs 9,000 respectively. To control weeds, a liquid herbicide

has to be used for crops X and Y at rates of 20 litres and 10 litres per hectare. Further, no more than 800 litres of herbicide should be used in order to protect fish and wild life using a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximise the total profit of the society?

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65. A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two food F1 and F2 are available. Food F1 costs Rs. 4 per unit food and F2 costs Rs. 6 per unit. One unit of food F1 contains 3 units of vitamin A and 4 units of minerals. One unit of food F2 contains 6 units of vitamin A and 3 units of minerals. Formulate this-as linear programming problem. Find the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.

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66. Food X contains 6 units of vitamin A per g and 7 units of vitamin B per g and costs Rs 2 per g. Food Y contains 8 units of vitamin A per g and food Y contains 8 units of vitamin A per g and 12 units of vitamin B per g and costs Rs 2.50 per g. The daily minimum requirement of vitamin A and vitamin B are 100 units and 120 uniys respectively. Formulate the above as a LPP to minimize the cost.

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67. A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two food F1 and F2 are available. Food F1 costs Rs. 4 per unit food and F2 costs Rs. 6 per unit. One unit of food F1 contains 3 units of vitamin A and 4 units of minerals. One unit of food F2 contains 6 units of vitamin A and 3 units of minerals. Formulate this-as linear programming problem. Find the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.

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68. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs 50 per kg to purchase Food 'I' and Rs 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture.

Watch Video Solution

69. There are two factories located one at place P and the other at place Q. From these locations, a certain commodity is to be delivered to each of the three depots situated at A, B and C. The weekly requirements of the depots are respectively 5,5 and 4 units of the commodity while the production capacity of the factories at P and Q are respectively 8 and 6 units. The cost of transportation per unit is given below :

From/To	Cost (in ₹)		
	A	B	C
P	160	100	150
Q	100	120	100

How many units should be transported from each factory to each depot in order that the transportable cost is minimum. When will be the minimum transportation cost?

Watch Video Solution

70. In how much time will a train 250 m long, running at 50 km/hr pass a man, running at 5 km/hr in the same direction in which the train is going?

Watch Video Solution

71. Solve the following LPP graphically : Maximize $Z = 3x + 5y$ subject to $x + y \leq 2, x + 3y \geq 3, x \geq 0, y \geq 0$

Watch Video Solution

72. Solve the following LPP graphically : Maximize $Z = -3x + 4y$ subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$

Watch Video Solution

73. In a triangle ABC, if a = 18, b = 24 and c = 30, find sin A, sin B and sin C.

Watch Video Solution

74. Solve the following LPP graphically : Minimize $Z = 3x + 5y$ subject to $x + 3y \geq 3, x + y \geq 2, x, y \geq 0$

Watch Video Solution

75. In a triangle ABC, if a = 18, b = 24 and c = 30. Is it a right angled triangle?

Watch Video Solution

76. Solve the following Linear Programming Problem graphically: Minimise $Z = x + 2y$ subject to : $2x + y \geq 3, x + 2y \geq 6, x, y \geq 0$

Watch Video Solution

77. Graphically minimize and maximize $z = 5x + 10y$ subject to the constraints: $x + 2y \leq 120, x + y \leq 60, x - 2y \geq 0x, y \geq 0.$

Watch Video Solution

78. Maximise $Z = x + 2y$ subject to: $x + 2y \geq 100, 2x - y \leq 0, 2x + y \leq 200, x, y \geq 0$

Watch Video Solution

79. Maximize $Z = -x + 2y$ subject to $x \geq 3, x + y \geq 5, x + 2y \geq 6, y \geq 0$

Watch Video Solution

80. Maximise $Z = x + y,$ subject to $x - y \leq -1, -x + y \leq 0, x, y \geq 0$

Watch Video Solution

81. Reshma wishes to mix two types of food P and Q in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 11 units of vitamin B. Food P costs Rs 60/kg and food Q costs Rs 80/kg. Food P contains 3 units/kg of vitamin A and 5 units/kg of vitamin B while food Q contains 4 units/kg of vitamin A and 2 units/kg of vitamin B. Determine the minimum cost of the mixture.

Watch Video Solution

82. One kind of cake requires 200g of flour and 25g of fat, and another kind of cake requires 100g of flour and 50g of fat. Find the maximum number of cakes which can be made from 5kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes.

Watch Video Solution

83. A factory makes tennis rackets and cricket bats. A tennis racket takes 1.5 hours of machine time and 3 hours of craftman's time in its making while a cricket bat takes 3 hour of machine time and 1 hour of craftman's time. In a day, the factory has the availability of not more than 42 hours of machine time and 24 hours of craftsman's time. What number of rackets and bats must be made if the factory is to work at full capacity?

Watch Video Solution

84. A factory makes tennis rackets and cricket bats. A tennis racket takes 1.5 hours of machine time and 3 hours of craftman's time in its making while a cricket bat takes 3 hour of machine time and 1 hour of craftman's time. In a day, the factory has the availability of not more than 42 hours of machine time and 24 hours of craftsman's time. If the profit on a racket and on a bat is Rs 20 and Rs 10 respectively, find the maximum profit of the factory when it works at full capacity.

Watch Video Solution

85. A manufacturer produces nuts and 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 Rs17.50 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 maximise his profit, if he operates his machines for at the most 12 hours a day?

Watch Video Solution

86. A factory manufactures two types of screws, A and B. Each type of screw requires the use of two machines, an automatic and a hand operated. It takes 4 minutes on the automatic and 6 minutes on hand operated machines to manufacture a package of screws A, while it takes 6 minutes on automatic and 3 minutes on the hand operated machines to manufacture a package of screws B. Each machine is available for at the most 4 hours on any day. The manufacturer can sell a package of screws A at a profit of Rs 7 and screws B at a profit of Rs 10. Assuming that he can sell all the screws he manufactures, how many packages of each type should the factory owner produce in a day in order to maximise his profit? Determine the maximum profit

Watch Video Solution

87. A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of a grinding/cutting machine and a sprayer. It takes 2 hours on grinding/cutting machine and 3 hours on the sprayer to

manufacture a pedestal lamp. It takes 1 hour on the grinding/cutting machine and 2 hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding/cutting machine for at the most 12 hours. The profit from the sale of a lamp is Rs 5 and that from a shade is Rs 3. Assuming that the manufacturer can sell all the lamps and shades that he produces, how should he schedule his daily production in order to maximise his profit?

Watch Video Solution

88. A company manufactures two types of novelty souvenirs made of plywood. Souvenirs of type A require 5 minutes each for cutting and 10 minutes each for assembling. Souvenirs of type B require 8 minutes each for cutting and 8 minutes each for assembling. There are 3 hours 20 minutes available for cutting and 4 hours for assembling. The profit is Rs 5 each for type A and Rs 6 each for type B souvenirs. How many souvenirs of each type should the company manufacture in order to maximise the profit?

Watch Video Solution

89. A merchant plans to sell two types of personal computers – a desktop model and a portable model that will cost Rs 25000 and Rs 40000 respectively. He estimates that the total monthly demand of computers will not exceed 250 units. Determine the number of units of each type of computers which the merchant should stock to get maximum profit if he does not want to invest more than Rs 70 lakhs and if his profit on the desktop model is Rs 4500 and on portable model is Rs 5000.

Watch Video Solution

90. A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two food F1 and F2 are available. Food F1 costs Rs. 4 per unit food and F2 costs Rs. 6 per unit. One unit of food F1 contains 3 units of vitamin A and 4 units of minerals. One unit of food F2 contains 6 units of vitamin A and 3 units of minerals. Formulate this-as linear programming problem. Find the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements.

Watch Video Solution

91. A farmer has a supply of chemical fertilizer of type A which contains 10 % nitrogen and 6% phosphoric acis and type B fertilizer which contains 5% nitrogen and 10% phosphoric acid. After testing the soil condition of a field, it is found that at least 14 kg of nitrogen and 14 kg of phosphoric acid are required for a good crop. The fertilizer type A costs Rs 5 per kg and type B Rs 3 per kg. How many kilograms of each fertilizer should be used to meet the requirements and the cost be minimum? Using LPP, solve the above problem graphically.

Watch Video Solution

92. The corner points of the feasible region determined by the following system of linear inequalities: : $2x + y \leq 10, x + 3y \leq 15, x, y \geq 0$ are $(0, 0), (5, 0), (3, 4)$ and $(0, 5)$. Let $Z = px + qy,$ where $p, q > 0,$ Condition on p and q so that the maximum of Z occurs at both (3, 4) and (0, 5) is:

A. $p = 3q$

B. $p = 2q$

C. $p = q$

D. $q = 3p$

Answer:

Watch Video Solution

93. (Diet problem)A dietician has to develop a special diet using two foods P and Q. Each packet (containing 30 g) of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and at most 300 units of cholesterol. How many packets of each food should be used to minimise the amount of vitamin A in the diet? What is the minimum amount of vitamin A?

Watch Video Solution

94. A farmer mixes two brands P and Q of cattle feed. Brand P, costing Rs 250 per bag, contains 3 units of nutritional element A, 2.5 units of element B and 2 units of element C. Brand Q costing Rs 200 per bag contains 1.5 units of nutritional element A, 11.25 units of element B and 3 units of element C. The minimum requirements of nutrients A,B and C are 18 units, 45 units and 24 units respectively. Determine the number of bags of each brand which should be mixed in order to produce a mixture having a minimum cost per bag? What is the minimum cost of the mixture per bag?

Watch Video Solution

95. A dietician wishes to mix together two kinds of food X and Y in such a way that the mixture contains at least 10 units of vitamin A, 12 units of vitamin B and 8 units of vitamin C. The vitamin contents of one kg food is given below:

Food	Vitamin A	Vitamin B	Vitamin C
X	1	2	3
Y	2	2	1

One kg of food X costs Rs 16 and one kg of food Y costs Rs 20. Find the least cost of the mixture which will produce the required diet?

Watch Video Solution

96. A manufacturer makes two types of toys A and B. Three machines are needed for this pupose and the time (in minutes) required for each toy on the machines is given below :

Types of Toys	Machines		
	I	II	III
A	12	18	6
B	6	0	9

Each machine is available for a maximum of 6 hours per day. If the profit on ech toy of type A is Rs 7.50 and that on each toy B is Rs 5, show that 15 toys of type A and 30 of type B should be manufactured in a day to gat maximum profit.

Watch Video Solution

97. An aeroplane can carry maximum of 200 passengers, A profit of ₹ 400 is made on each first class ticket and a profit of ₹ 300 is made in each second class ticket. The airline reserves at least 20 seates for first class. However, at least four times as many passengers prefer to travel by second class than first class. Determine how many tickets of each type must be sold to maximise profit for the airline. Form an L.P.P. and solve it graphically.

Watch Video Solution

98. Two godowns A and B have grain capacity of 100 quintals and 50 quintals respectively. They supply to 3 ration shops D,E and F whose requirements are 60, 50 and 40 quintals respectively. The cost of transportation per quintal from the godowns to the shops are given in the following table:

Transportation cost per quintal (in ₹)

From/To	A	B
D	6	4
E	3	2
F	2·50	3

How should the supplies be transported in order that the transportation cost s minimum? What is the minimum cost?

Watch Video Solution

99. An oil company has teo depots A and B with capacity of 7000L and 4000L respectively. The company is to supply oil to three petrol pumps D,E and F whose requirements are 4500L, 3000L and 3500L respectively. The distance between the depots and the petrol pumps is given in the following table:

Distance in (km)

From/To	A	B
D	7	3
E	6	4
F	3	2

Assuming that

the transportation cost of 10 litres of oil is Rs 1 per km, how should the delivery be scheduled in order that the transportation cost is minimum? What is the minimum cost?

Watch Video Solution

100. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added in the garden?

kg per bag		
	Brand P	Brand Q
Nitrogen	3	3.5
Phosphoric acid	1	2
Potash	3	1.5
Chlorine	1.5	2

Watch Video Solution

101. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added in the garden?

kg per bag		
	Brand P	Brand Q
Nitrogen	3	3.5
Phosphoric acid	1	2
Potash	3	1.5
Chlorine	1.5	2

If the grower wants to maximize the amount of nitrogen added to the garden, how many bags of each brand should be added? What is the maximum amount of nitrogen added?

Watch Video Solution

102. 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 type by at most 600 units. If the company makes 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 maximise the profit?

Watch Video Solution

103. Solve the following LPP graphically : Maximize $Z = 2x + 3y$, subject to $x + y \leq 4, x \geq 0, y \geq 0$

Watch Video Solution

104. Solve the following LPP graphically : Maximize $Z = 3x + 5y$, subject to $x + 2y \geq 10, x + y \geq 6, 3x + y \geq 8, x \geq 0, y \geq 0$

Watch Video Solution

105. Find the maximum and minimum values of $Z = 2x + y$ subject to the constraints : $x + 3y \geq 6, x - 3y \leq 3, 3x + 4y \leq 24, -3x + 2y \leq 6, 5x + y \geq 5, x, y \geq$.

Watch Video Solution

106. An aeroplane can carry maximum of 200 passengers, A profit of ₹ 400 is made on each first class ticket and a profit of ₹ 300 is made in each second class ticket. The airline reserves at least 20 seates for first class. However, at least four times as many passengers prefer to travel by second class than first class. Determine how many tickets of each type

must be sold to maximise profit for the airline. Form an L.P.P. and solve it graphically.

Watch Video Solution

107. A manufacturer of patent medicines is preparing a production plan on medicines, A and B. There are sufficient raw materials available to make 20000 bottles of A and 40000 bottles of B, but there are only 45000 bottles into which either of the medicines can be put. Further, it takes 3 hours to prepare enough material to fill 1000 bottles of A, it takes 1 hour to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. The profit is Rs 8 per bottle for A and Rs 7 per bottle for B. How should the manufacturer schedule his production in order to maximize his profit?

Watch Video Solution

108. A medical company has factories at two places. A and B. From these places, supply at P, Q and R. The monthly requirements of the agencies

are respectively 40, 40 and 50 packets of the medicines, while the production capacity of the factories A and B, are 60 and 70 packets respectively. The transportation cost per packet from the factories to the agencies are given below :

Transportation cost per packet (in ₹)

To \ From	A	B
P	5	4
Q	4	2
R	3	5

How many packets from each factory be transported to each agency so that the cost of transportation is minimum? Also find the minimum cost.

Watch Video Solution

109. Two godowns A and B have grain capacity of 100 quintals and 50 quintals respectively. They supply to 3 ration shops D,E and F whose requirements are 60, 50 and 40 quintals respectively. The cost of transportation per quintal from the godowns to the shops are given in the following table:

Transportation Cost per Quintal (in ₹)		
From/To	A	B
D	6	4
E	3	2
F	2·50	3

How should the supplies be transported in order that the transportation cost s minimum? What is the minimum cost?

Watch Video Solution

110. An oil company has teo depots A and B with capacity of 7000L and 4000L respectively. The company is to supply oil to three petrol pumps D,E and F whose requirements are 4500L, 3000L and 3500L respectively. The distance between the depots and the petrol pumps is given in the following table:

Distance in (km.)		
From / To	A	B
D	7	3
E	6	4
F	3	2

Assuming that

the transportation cost of 10 litres of oil is Rs 1 per km, how should the delivery be scheduled in order that the transportation cost is minimum? What is the minimum cost?

Watch Video Solution

111. A soft drinks firm has two bottling plants, one located at P and the located at Q. Each plant produces three different soft drinks A, B and C. The capacities of two plants in number of bottles per day, are as follows:

Product	Plant P	Plant Q
A	3000	1000
B	1000	1000
C	2000	6000

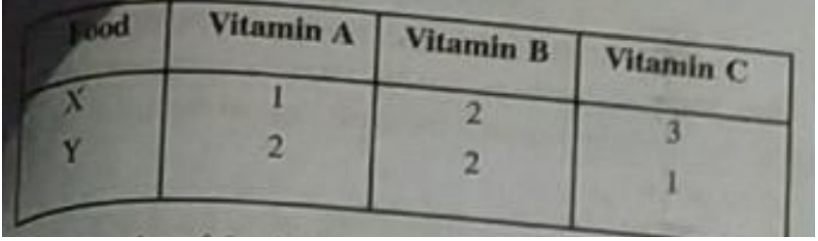
A market survey indicates that during the month of April, there will be a demand for 24000 botlles of A, 16000 bottles of B and 48000 bottles of C. The cost of running the two plants P and Q are respectively Rs 6000 and Rs 4000 per day. Find graphically, the number of days for which either of the two plants P and Q should be run in the month of April so as to minimise production cost while still meeting the market demand.

Watch Video Solution

112. 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 type by at most 600 units. If the company makes 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 maximise the profit?

Watch Video Solution

113. A dietician wishes to mix together two kinds of food X and Y in such a way that the mixture contains at least 10 units of vitamin A, 12 units of vitamin B and 8 units of vitamin C. The vitamin contents of one kg food is given below:



Food	Vitamin A	Vitamin B	Vitamin C
X	1	2	3
Y	2	2	1

One kg of food X costs Rs 16 and one kg of food Y costs Rs 20. Find the least cost of the mixture which will produce the required diet?

Watch Video Solution

114. (Diet problem)A dietician has to develop a special diet using two foods P and Q. Each packet (containing 30 g) of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and at most 300 units of cholesterol. How many packets of each food should be used to minimise the amount of vitamin A in the diet? What is the minimum amount of vitamin A?

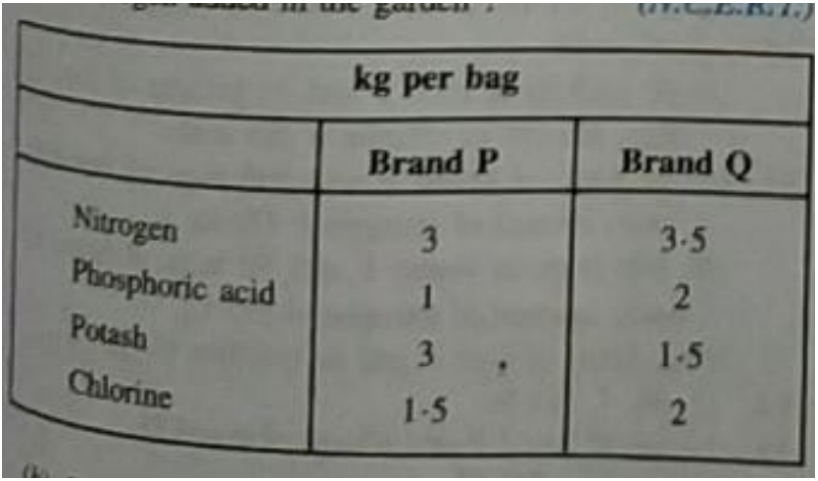
Watch Video Solution

115. (Diet problem)A dietician has to develop a special diet using two foods P and Q. Each packet (containing 30 g) of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and at most 300 units of cholesterol. How many packets of each food should be used to minimise the amount of vitamin A in the diet? What is the minimum amount of vitamin A?

Watch Video Solution

116. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each

brand should be used? What is the minimum amount of nitrogen added in the garden?



	kg per bag	
	Brand P	Brand Q
Nitrogen	3	3·5
Phosphoric acid	1	2
Potash	3	1·5
Chlorine	1·5	2

Watch Video Solution

117. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added

in the garden?

kg per bag		
	Brand P	Brand Q
Nitrogen	3	3.5
Phosphoric acid	1	2
Potash	3	1.5
Chlorine	1.5	2

Watch Video Solution

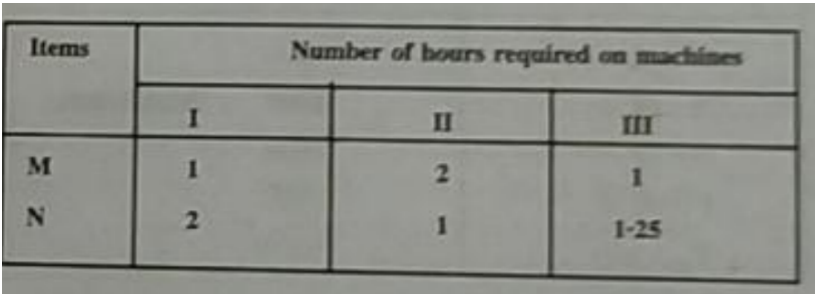
118. A factory owner purchases two types of machines A and B for his factory. The requirements and limtations for the machines are as follows:

	Area occupied by the machine	Labour force for each machine	Daily output in units
Machine A	1000 sq. m.	12 men	60
Machine B	1200 sq. m.	8 men	40

He has an area of 9000 sq m available and 72 skilled men who can operate the machines. How many machines of each type should he buy to maximize th daily output?

Watch Video Solution

119. A manufacturer has three machines I, II and III installed in his factory. Machines I and II are capable of being operated for at most 12 hours whereas machine III must be operated for at least 5 hours a day. She produces only two items M and N each on the three machines are given in the following table:



Items	Number of hours required on machines		
	I	II	III
M	1	2	1
N	2	1	1·25

SHe makes a profit of Rs 600 and Rs 400 on items M and N respectively. How many of each item should she produce so as to maximise her profit assuming that she can sell all the items that she produced? What will be the maximum Profit?

Watch Video Solution

120. A manufaturer makes two types of toys, A and B cups. Three machines are needed for the the manufacture and the time in minutes required for each cup on the machines in given below:

Types of Toys	Machines I	II	III
A	12	18	6
B	6	0	9

Each machine is available for a maximum of 6 hours per day. If the profit on each toy of type A is Rs 7.5 and that on each toy of type B is Rs 5, show that 15 toys of type A and 30 of type B should be manufactured in a day to get the maximum profit.

Watch Video Solution

121. A farmer mixes two brands P and Q of cattle feed. Brand P, costing Rs 250 per bag, contains 3 units of nutritional element A, 2.5 units of element B and 2 units of element C. Brand Q costing Rs 200 per bag

contains 1.5 units of nutritional element A, 11.25 units of element B and 3 units of element C. The minimum requirements of nutrients A,B and C are 18 units, 45 units and 24 units respectively. Determine the number of bags of each brand which should be mixed in order to produce a mixture having a minimum cost per bag? What is the minimum cost of the mixture per bag?

Watch Video Solution

122. A packet of plain biscuits costs Rs 6 and that of chocolate bisuits costs Rs 9. A house-wife has Rs 72 and wants to buy at least three packets of plain biscuits and at least four of chocolate biscuits. How many of each type should she buy so that she can have maximum number of packets? Make it as a LPP and solve it graphically.

Watch Video Solution

123. The graph of the inequation $2x + 3y \geq 6$ does not lie in the first quadrant. (true/false)

Watch Video Solution

124. The graph of the inequation $3x + 2y > 6$ does not lie in the fourth quadrant. (true/false)

Watch Video Solution

125. The objective function is maximum or minimum at a point, which lies on the boundary of the feasible region .

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126. Maximize $Z = x + 2y$ subject to : $x + y \geq 5, x \geq 0, y \geq 0$

Watch Video Solution

127. Maximize $Z = 4x + y$ subject to : $x + y \leq 50, x, y \geq 0$

Watch Video Solution

128. What is optimum solution?

Watch Video Solution

129. What is objective function?

Watch Video Solution

130. What is feasible region?

Watch Video Solution

131. What is feasible solution?

Watch Video Solution

132. What is optimal solution?

Watch Video Solution

133. The corner points of the feasible region determined by the following system of linear inequalities: : $2x + y \leq 10, x + 3y \leq 15, x, y \geq 0$ are $(0, 0), (5, 0), (3, 4)$ and $(0, 5)$. Let $Z = px + qy$, where $p, q > 0$, Condition on p and q so that the maximum of Z occurs at both (3, 4) and (0, 5) is:

A. $p = 3q$

B. $p = 2q$

C. $p = q$

D. $q = 3p$

Answer:

Watch Video Solution

134. If $P(A) = \frac{1}{2}, P(B) = 0$ then $P(A \mid B)$ is :

A. 0

B. $\frac{1}{2}$

C. not defined

D. 1

Answer:

Watch Video Solution

135. The corner points of the feasible region determined by the system of linear constraints are : (0,10),(5,5),(15,15) and (0,20). Let $Z = px + qy$, where $p, q > 0$. Condition on p and q so that the maximum of Z occurs at both (15,15) and (0,20) is :

A. $p = q$

B. $p = 2q$

C. $q = 2p$

D. $q = 3p$

Answer:

Watch Video Solution

136. The feasible solution for a LPP is shown in the following figure. Let $Z = 3x - 4y$ be the objective function.

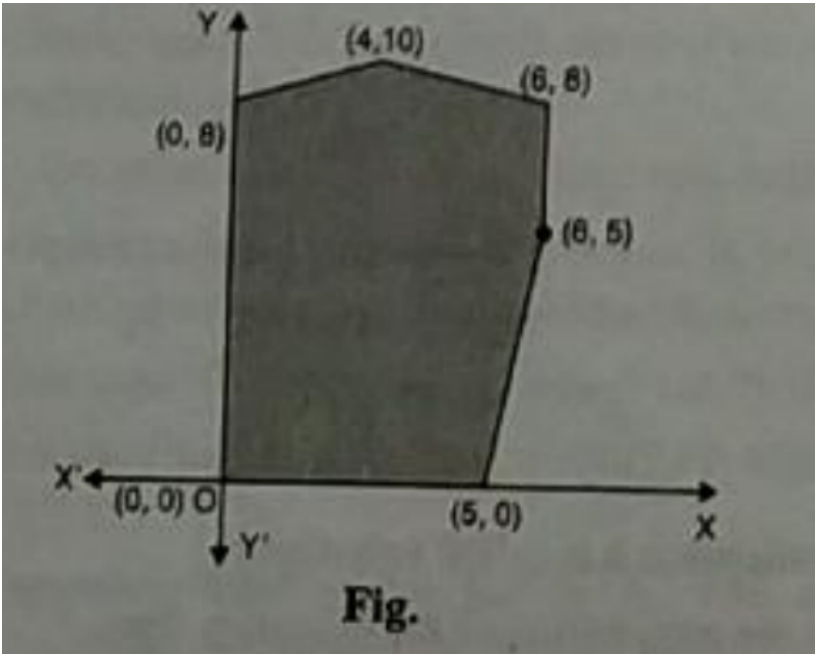

Fig.

Maximum of Z occurs at:

A. (0,0)

B. (0,8)

C. (5,0)

D. (4,10)

Answer:

Watch Video Solution

137. The feasible solution for a LPP is shown in the following figure. Let $Z = 3x - 4y$ be the objective function.

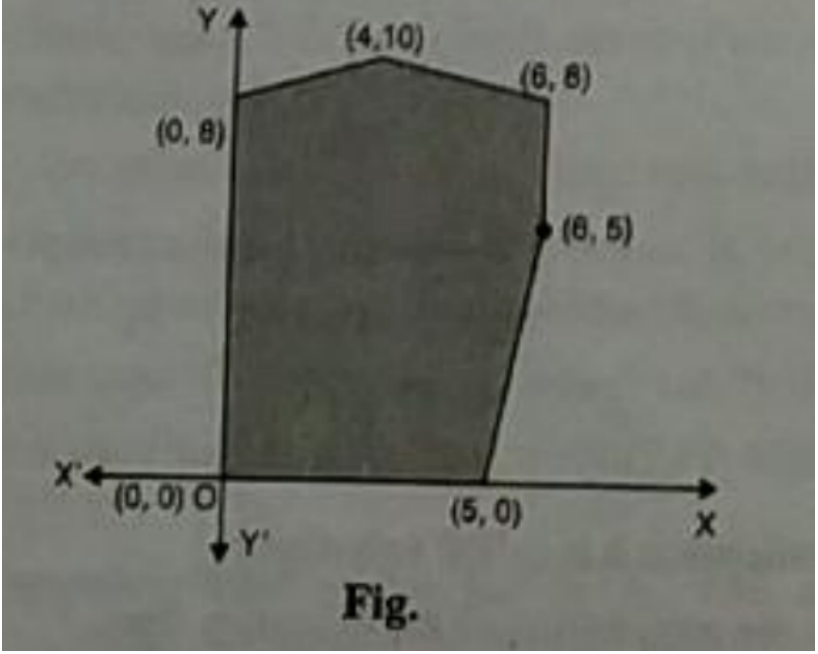

Fig.

Maximum of Z occurs at:

A. (5,0)

B. (6,5)

C. (6,8)

D. (4,10)

Answer:

Watch Video Solution

138. The maximum value of $Z = 3x + 4y$ subject to the contraints : $x + y \leq 4, x \geq 0, y \geq 0$ is :

A. 0

B. 12

C. 16

D. 18

Answer:

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139. The maximum value of $Z = 3x + 5y$ subject to the contraints : $x + y \leq 4, x \geq 0, y \geq 0$ is :

A. 0

B. 12

C. 20

D. 32

Answer:

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140. The maximum value of $Z = 4x + 5y$ subject to the contraints : $x + y \leq 4, x \geq 0, y \geq 0$ is :

A. 1) 0

B. 2) 16

C. 3) 26

D. 4) 36

Answer:

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141. The maximum value of $Z = 2x + 3y$ subject to the contraints : $x + y \leq 1, 3x + y \leq 4, x \geq 0, y \geq 0$ is :

A. 2

B. 4

C. 5

D. 3

Answer:

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142. Minimum value of $Z = 5x + 3y$ subject to $2x + y \geq 10, x + 3y \geq 15, x \leq 10, y \leq 8, x, y \geq 0$ is :

A. 27

B. 25

C. 28

D. 30

Answer:

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143. Any point in half plane $2x + 3y - 12 \geq 0$ is

A. (-7,8)

B. (7,-8)

C. (-7,-8)

D. (7,8)

Answer:

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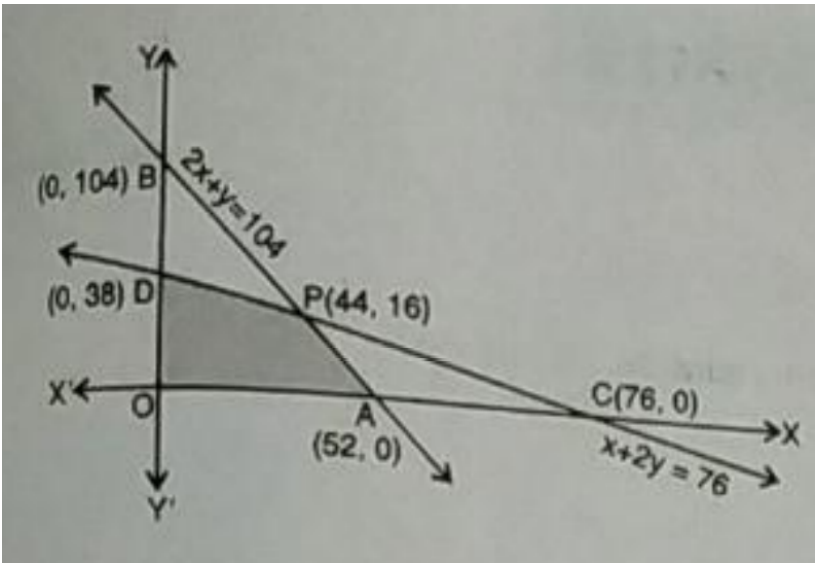
144.



The linear constraints for which the shaded area in the above figure is the solution set, are :

A. 1) $2x + y \geq 104, x + 2y \leq 76, x, y \geq 0$

B. 2) $2x + y \leq 104, x + 2y \leq 76, x, y \geq 0$

C. 3) $2x + y \leq 104, x + 2y \geq 76, x, y \geq 0$

D. 4) $2x + y \geq 104, x + 2y \geq 76, x, y \geq 0$

Answer:

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145. Any feasible solution which maximises or minimises the objective function is called:

A. a regional feasible solution

B. an optimal feasible solution

C. an objective feasible solution

D. none of these

Answer:

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146. If $x + y \leq 2, x \geq 0, y \geq 0$, the point at which maximum value of $3x + 2y$ attained will be:

A. (0,2)

B. (0,0)

C. (2,0)

D. $\left(\frac{1}{2}, \frac{1}{2}\right)$

Answer:

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147. The graph of the inequation $3x + 2y > 6$ does not lie in the fourth quadrant. (true/false)

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148. Draw the graph of the following LPP: $3x + y \leq 17, x \geq 0, y \geq 0.$

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149. Maximize $Z = 4x + y$ subject to : $x + y \leq 50, x, y \geq 0$

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150. Solve the following LPP graphically : Maximize $Z = 4x + y$ subject to $x + y \leq 50, 3x + y \leq 90, x \geq 0, y \geq 0$

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151. Solve the following LPP graphically : Maximize $Z = -3x + 4y$ subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$

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152. If a man rides his motor cycle at 25 km/hr, he has to spend Rs 2 per km on petrol, if he rides at a faster speed of 40 km/hr, the petrol cost increases to Rs 5 perkm. He has Rs 100 to spend on petrol and wishes to find maximum distance he can travel within one hour. Express this as a linear programming problem and then solve it graphically.

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153. A manufacturer produces two products A and B. Both the products are processed on two different machines. The available capacity of first machine is 12 hours and that of second machine is 9 hours per day. Each unit of product A requires 3 hours on both machines and each unit of product B requires 2 hours on first machine and 1 hour on second machine. Each unit of product A is sold at Rs 5 profit and that of B at a profit of Rs 6. Find the production level per day for maximum profit graphically.

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154. Two tailors A and B earn Rs 150 and Rs 200 per day respectively. A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day. How many days shall each work it it is desired to produce (at least) 60 shirts ands 32 pants at a minimum labour cost? Solve the problem graphically.

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155. A cooperative society of farmers has 50 hectare of land to grow two crops X and Y. The profit from crops X and Y per hectare are estimated as Rs 10,500 and Rs 9,000 respectively. To control weeds, a liquid herbicide has to be used for crops X and Y at rates of 20 litres and 10 litres per hectare. Further, no more than 800 litres of herbicide should be used in order to protect fish and wild life using a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximise the total profit of the society?

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156. A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contains atleast 8 units of vitamin A and 10 units of vitamin C. Food I contains two units/kg of vitamin A and one unit /kg of vitamin C while Food II contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It cost Rs 5 per kg to purchase Food I and Rs 7 per

kg to purchase food II. Formulate the problem for minimum of such a mixture. Formulate tha above as a LPP and solve it graphically.

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