MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

LINEAR PROGRAMMING

Others

1. A gardener has supply of fertilizer A which consists of 10% nitrogen and 6% phosphoric acid and fertilizer B which consists of 5% nitrogen and 10% phosphoric acid. After testing the soil conditions, he finds that he needs at least 14 kg of nitrogen and 14 kg of phosphoric acid for his crop. If fertilizer A costs 10.60 per kg and fertilizer B costs 8.40 per kg, what is the minimum cost at which the farmer can meet the nutrient requirement by using a combination of both types of fertilizers?

A. a. $Rs.1488$

B. b. $Rs.1576$

C. c. $Rs.1648$

D. d. $Rs.1732$

Answer: null

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2. Solve the following linear programming problem graphically: Maximise $Z = 4x + y \ldots$ (1) subject to the constraints: $x + y \leq 50 \ldots$.(2) $3x + y \leq 90 \ldots$.(3) $x \geq 0, y \geq 0 \ldots$.(4)

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

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4. A manufacturer of a line of patent medicines is preparing a production plane on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40, 000 bottles of B but there are only 45, 000 bottles into which either of the medicines can be put. Further more, it takes 3 hours to prepare enough material to fill 100 bottles of A, it takes on hours to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. Te profit is Rs. 8 per bottle for A and Rs. 7 per bottle for B. Formulate this problem as a linear programming problem.

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5. An automobile manufacturer makes automobiles and trucks in a factory that is divided into two shops. Shop A, which performs the basic assembly operation must work 5 man-days on each truck but only 2 man-days on each automobile. Shop B, which performs finishing operations, must work 3 man-days for each automobile or truck that it produces. Because of men and machine limitations, shop A has 180 man-days per week available

while shop B has 135 man-days per week. If the manufacturer makes a profit of Rs. 30000 on each truck and Rs. 2000 on each automobile, how many of each should he produce to maximize his profit?, Formulate this as a LPP.

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6. Two tailors A and B earn Rs. 150 and Rs. 200 per day respectively. A can stitch 6 shirts and 4 pants per day while B can stitch 10 shirts and 4 pants per day. Form a linear programming problem to minimize the labour cost to produce at least 60 shirts an 32 pants.

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7. To maintain his health a person must fulfil certain minimum daily requiremens for several kinds of nutrients. Assuming that there are only thee kinds of nutrients-calcium, protein and calories and the person's diet consists of only two food items, I and II, whose price and nutrient contents are shown in the table below: , Food I (per Ib), Food II (per Ib),

Minimum daily requirement for the nutrient Calcium Protein Calories, 10 5 2, 5 4 6, 20 20 13 Price (Rs.), 60, 100, What combination of two food items will satisfy the daily requirement and entail the least cost? Formulate this as a LPP.

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8. Vitamins A and B are found in two different foods $F_1 \ and \ F_2$. One unit of food F_1 contains 2 units of vitamin A and 3 units of vitamin B. One unit of food F_2 contains 4 units of vitamin A and 2 units of vitamin B. One unit of food $F_1 \ and \ F_2$ cost Rs. 50 and 25 respectively. The minimum daily requirements for a person of vitamin A and B is 40 and 50 units respectively. Assuming that anything in excess of daily minimum requirement of vitamin A and B is not harmful, find out the optimum mixture of food $F_1 \ and \ F_2$ at the minimum cost which meets the daily minimum requirement of vitamin A and B. Formulate this as a LPP.

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9. A firm manufactures two types of products, A and B, and sells them at a profil of 3 per unit to type B product and 5 perunit of type A product. Both product is processed on two machines M1and M2 One unit of type A requires one minute of processing time on M1 and two minutes of processing time on M2i whereas one unit of type B requires one minute of processing time on M1 and one minute on M Machines sells them at a profit of 5 per unit of type A and M, and M, are respectively available for at most 5 hours and 6 hours in a day. Find out how many units of each type of product the firn should produce a day in order to maximize the profit. Solve the problem graphically [CHSE 2000]

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10. A company sells two different products A and B. The two products are produced in a common production process and are sold in two different markets. The production process has a total capacity of 45000 man-hours. It takes 5 hours to produce a unit of A and 3 hours to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 7000 ad that of B

is 10,000. If the profit is Rs. 60 per unit for the product A and Rs. 40 per unit for the product B, how many units of each product should be sold to maximize profit? Formulate the problem as LPP.

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11. A company is making two products A and B. The cost of producing one unit of products A and B are Rs. 60 and 80 respectively. As per the agreement, the company has to supply at least 200 units of product B to its regular customers. One unit of product A requires one machine hour whereas product B has machine hours available abundantly within the company. Total machine hours available for product A are 400 hours. One unit of each product A and B requires one labour hour each and total of 500 labour hours are available. The company wants to minimize the cost of production by satisfying the given requirements. Formulate this problem as a LPP.

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12. The objective of A diet problem is to ascertain the quantities of certain foods that should be eaten to meet certain nutritional requirement at minimum cost. The consideration is limited to milk, beaf and eggs, and to vitamins A, B, C. The number of milligrams of each of these vitamins contained within A unit of each food is given below: Vitamin, Litre of milk, Kg of beaf, Dozen of eggs, Minimum daily requirements A B C, 1 100 10, 1 10 100, 10 10 10, 1 mg 50 mg 10 mg Cost, Rs. 1.00, Rs. 1.10, Rs. 0.50, What is the linear programming formulation for this problem?

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13. A factory produces two product $P_1 and P_2$. Each of the product P_1 requires 2 hrs for moulding, 3 hrs for grinding and 4 hrs for polishing, and each of the product P_2 requires 4 hrs for moulding, 2 hrs for grinding and 2 hrs for polishing. The factory has moulding machine available for 20 hrs, grinding machine for 24 hrs polishing machine available for 13 hrs. The profit is Rs. 5 per unit of P_1 and Rs 3 per unit of P_2 and the factory can sell all that it produces . Formulate the problem as a linear programming problem to maximize the profit.

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14. 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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15. A firm can produce three types of cloth say C_1, C_2, C_3 . Three kinds of wool are required for it, say red wool, green wool and blue wool. One unit of length C_1 needs 2 metres of red wool, 3 metres of blue wool; one unit of cloth C_2 needs 3 metres of red wool 2 metres of blue wool and 2 metres of green and one unit of cloth C_3 needs 5 metres of green wool and 4 metres of blue wool. The firm has only a stock of 16 metres of red

wool, 20 metres of green wool and 30 metres of blue wool. It is assumed that the income obtained from one unit of length of cloth C_1 is Rs. 6, of cloth C_2 is Rs. 10 and of cloth C_3 is Rs. 8. Formulate the problem as a linear programming problem to maximize the income.

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16. A toy company manufactures two types of doll; a basic version doll; a basic version doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one of type. A and the company would have time to ,make a maximum of 2, 000 per day if it produces only the basic version. The supply of plastic is sufficient to produce 1500 dolls per day (both A and B combined). The deluxe version requires a fancy dress of which there are only 600 per day available. If the company makes profit Rs. 3 and Rs. 5 per doll respectively o doll A and doll B; how many of each should be produced per day in order to maximize profit?

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17. A manufacturer of a line of patent medicines is preparing a production plane on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40, 000 bottles of B but there are only 45, 000 bottles into which either of the medicines can be put. Further more, 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. Te profit is Rs. 8 per bottle for A and Rs. 7 per bottle for B. Formulate this problem as a linear programming problem.

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18. A furniture form manufactures chairs and tables, each requiring the use of three machines A, B and C. Production of one chair requires 2 hours on machine A, 1 hour on machine B, and 1 hour on machine C. Each table requires 1 hour each on machines A and B and 3 hours on machine C. Profit realized by selling one chair is Rs. 30 while for a table the figure 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. How many chairs

and table should be made per week so as to maximize profit? Develop a mathematical formulation.

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19. A company makes two kinds of leather belts, A and B. Belt A is high quality belt, and B is of lower quality. The respective profits are Rs. 40 and Rs. 30 per belt. Each belt of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle, and only 400 buckles per day are available. There are only 700 buckles available for belt B. What should be the daily production of each type f belt? Formulate the problem as a LPP.

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20. A resourceful home decorator manufactures two types of lamps say A and B. Both lamps go through two technician, first a cutter, second a

finisher. Lamp A requires 2 hours of th cutter's time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutter's and 2 hours of finisher's time. The cutter has 104 hours and finisher has 76 hours of time available each month. Profit o one lamp A is Rs. 6.00 and on one lamp B is Rs.11.00. Assuming that he can sell all that he produces, how many of each type of lamps should he manufacture to obtain the best return.(formulate the LPP)

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21. A diet is to contain at least 4000 units of carbohydrates, 500 units of fat and 300 units of protein. Two foods F_1 and F_2 are available. Food F_1 costs 2 Rs. per unit and food F_2 costs 4 Rs. per unit. A unit of food F_1 contains 10 units of carbohydrates, 20 units of fat and 15 units of protein. A unit of food F_2 contains 25 units of carbohydrates, 10 units of fat and 20 units of protein. Find the minimum cost for a diet that consists of a mixture of these two foods and also meets the minimum requirements.

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22. A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contain at least 8 units f Vitamin A and 10 units of vitamin C, Food 'I' contains 2 units per kg of vitamin A and 1 unit per kg of vitamin C while food 'II' contains 1 unit per kg of vitamin A and 2 units per kg of vitamin C. It costs Rs 50.00 per kg to purchase food 'I' and Rs. 70.00 per kg to produce food 'II'. Formulate the above linear programming problem to minimize the minimize the cost of such a mixture.

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23. A dice is throwed once. Probability of getting 5

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24. A dietician has to develop a social 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?

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25. A diet to two foods $F_1 and F_2$ contains nutrients thiamine, phosphorous and iron. The amount of each nutrient in each of the food (in milligrams per 25 gms) is given in the following table: Food Nutrients, F_1 , F_2 Thiamine, 0.25, 0.10 Phosphorous, 0.75, 1.50 Iron, 1.60, 0.80 The minimum requirement of the nutrients in the diet are 1.00 mg of thiamine, 7.50mg of phosphorous and 10.00 mg of iron. The cost F_1 is 20 paise per 25 gms while the cost of F_2 is 15 paise per 25 gms. Find the minimum cost of diet.

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26. Every gram of wheat provides 0.1 gm of proteins and 0.25 gm of carbohydrates. The corresponding values f rice are 0.05 gm and 0.5 gm respectively. Wheat costs Rs. 4 per kg ad rice Rs. 6. The minimum daily requirements of proteins and carbohydrates for an average child are 50 gms and 200 gms respectively. In what quantities should wheat and rice be mixed in the daily diet to provide minimum daily requirements. In what quantities should wheat and rice be mixed in the daily diet to provide minimum daily requirements of proteins and carbohydrates at minimum cost?

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27. Kellogg is a new cereal formed of a mixture of bran and rice, that contains at least 88 grams of protein and at least 36 milligrams of iron. Knowing that bran contains 80 grams of protein and 40 milligrams of iron per kilogram and that rice contains 100 grams of protein and 30 milligrams of iron per kilogram, find the minimum cost of producing this new cereal f bran costs5 per kilogram and rice costs 4 per kilogram

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28. Solve the following liner programming problems by graphical method:

Minimize $Z = x - 5y + 20$ Subject to $x - y \geq 0$ $-x + 2y \geq 2$ $x \geq 3$ $y \leq 4$ $x, y \geq 0$

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29. Solve the following liner programming problems by graphical method:

Maximize $Z = -x_1 + 2x_2$, if possible, Subject to the constraints $x_1 - x_2 \leq -1$ $-x_1 + x_2 \leq 0$ $x_1, x_2 \geq 0$

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30. Solve the following liner programming problems by graphical method:

Minimize $Z = 5x + 3y$ Subject to $2x + y \geq 10$ $x + 3y \geq 15$ $x \leq 10$ $y \leq 8$ $x, y \geq 0$

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31. Find the maximum and minimum value of $2x + y$ subject to the constraints:

$x + 3y \geq 6, x - 3y \leq 3, 3x + 4y \leq 24, -3x + 2y \leq 6, 5x + y \geq 5, x, y \geq$

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32. There are two types of fertilisers 'A' and 'B'. 'A' consists of 12% nitrogen and 5% phosphoric acid whereas 'B' consists of 4% nitrogen and 5% phosphoric acid. After testing the soil conditions, farmer finds that he needs at least 12 kg of nitrogen and 12 kg of phosphoric acid for his crops. If 'A' costs Rs. 10 per kg and 'B' cost Rs. 8 per kg, then graphically determine how much of each type of fertiliser should be used so that nutrient requirement are met at a minimum cost.

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33. (Manufacturing problem) A manufacturing company makes two models A and B of a product. Each piece of Model A requires 9 labour hours for fabricating and 1 labour hour for finishing. Each piece of Model B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing, the maximum labour hours available are 180 and 30 respectively. The company makes a profit of Rs 8000 on each piece of model A and Rs 12000 on each piece of Model B. How many-pieces of Model A and Model B should be manufactured per week to realise a maximum profit? What is the maximum profit per week?

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34. Solve the following linear programming problem graphically: Maximize $Z = 50x + 15y$ Subject to $5x + y \leq 100\ x + y \leq 60\ x, y \geq 0$

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35. 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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36. Solve the Following Linear Programming Problem graphically : Minimise $Z = 3x + 4y$ Subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$.

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37. A firm manufactures two products, each of which must be processed through two departments, 1 and 2. The hourly requirements per unit for each product in each department, the weekly capacities in each department, selling price per unit, labour cost per unit, and raw mater cost per unit are summarized as follows: , Product A, Product B, Weekly capacity Department 1 Department 2 Selling price per unit Labour cost

per unit Raw material cost per unit, 3 4 Rs. 25 Rs. 16 Rs. 4, 2 6 Rs. 30 Rs. 20 Rs. 4, 130 260 The problem is to determine the number of units to produce each product so as to maximize total contribution to profit. Formulate this as a LPP.

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38. An airline agrees to charter planes for a group. The group needs at least 160 first class seats and at least 300 tourist class seats. The airline must use at least two of its model 314 planes which have 20 first class and 30 tourist class seats. The airline will also use some of its model 535 planes which have 20 first class seats and 60 tourist class seats. each flifgt of a model 314 costs rs 100,000. Each flight of a model 535 cost Rs. 150,000. How many of each type f plane should be used to minimize the flight cost? Formulate this as a LPP.

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39. Solve the Following Linear Programming Problem graphically : Minimise $Z = 3x + 5y$ such that $x + 3y \geq 3, x + y \geq 2, x, y \geq 0 x + 3y$.

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40. Solve the Following Linear Programming Problem graphically : Minimise $Z = 3x + 4y$ Subject to $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$.

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41. Solve the following LPP by graphically method: Minimize $Z = 20x + 10y$ Subject to $x + 2y \leq 40$ $x + y \geq 30$ $4x + 3y \geq 60$ and, $x, y \geq 0$

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42. Solve the Following Linear Programming Problem graphically : Maximise $Z = 5x + 3y$ subject to $3x + 5y \leq 15, 5x + 2y \leq 10, x \geq 0, y \geq 0$.

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43. Solve the following liner programming problems by graphical method: Maximize $Z = 5x + 3y$ Subject to $4x + 5y \leq 15\ 5x + 2y \leq 10\ x, y \geq 0$

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44. A firm manufacturing two types of electric items, A and B, can make a profit of Rs. 20 per unit of A and Rs. 30 per unit of B. Each unit of A requires 3 motors and 4 transformers and each unit of B requires 2 motors and 4 transformers. The total supply of these per month is restricted to 210 m0tors and 300 transformers. Type B is an export model requiring a voltage stabilizer which has a supply restricted to 65 units per

month. Formulate the linear programming problem for maximum profit and solve it graphically.

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45. A furniture manufacturing company plans to make two products: chairs and tables. From its available resources which consists of 400 square feet of teak wood and 450 man hours. It is known that to make a chair requires 5 square feet of wood and 10 man-hours and yields a profit of Rs. 45, while each table uses 20 square feet of wood and 25 man-hours and yields a profit of Rs. 80. How many items of each product should be produced by the company so that the profit is maximum?

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46. A firm manufactures two products A and B. Each product is processed on two machines $M_1 and M_2$. Product A requires 4 minutes of processing time on M_1 and 8 min. on M_2 ; product B requires 4 minutes on M_1 and 4 min. on M_2 . The machine M_1 is available for not more than 8 hrs 20

min. while machine M_2 is available for 10 hrs. during any working day. The products A and B are sold at a profit of Rs. 3 and Rs. 4 respectively. Formulate the problem as a linear programming problem and find how many products of each type should be produced by the firm each day in order to get maximum profit.

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47. A manufacturer considers that men and women workers are equally efficient and so he pays them at the same rate. He has 30 and 17 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 is 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 maximize the total revenue? Form the above as an LPP and solve graphically. Do you agree with this view of the manufacture that men and women workers are equally efficient and so should be paid at the same rate?

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48. A publisher sells a hard cover edition of a text book for Rs. 72.00 and a paperback edition of the same ext for Rs. 40.00. Costs to the publisher are Rs. 56.00 and Rs. 28.00 per book respectively in addition to weekly costs of Rs. 9600.00. Both types require 5 minutes of printing time, although hardcover requires 10 minutes binding time and the paperback requires only 2 minutes. Both the printing and binding operations have 4,800 minutes available each week. How many of each type o book should be produced in order to maximize profit?

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49. If $(p \wedge \sim r) \rightarrow (\sim p \vee q)$ is false, then truth values of p,q and r are respectively.

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50. A house wife wishes to mix together two kind 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. Vitamin A Vitamin B Vitamin C Food X: Food Y: 1 2 2 2 3 1 One kg of food X cost Rs. 6 and one kg of food Y costs Rs. 10. Find the least cost of the mixture which will produce the diet.

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51. A farm is engaged in breeding pigs. The pigs are fed on various products grown on the farm. In view of the need to ensure certain nutrient constituents (call them X,Y and Z), it is necessary to buy two additional products, say, A and B. One unit of product A contains 36 units of X, 3 units of Y, and 20 units of Z. One unit of product B contains 6 units of X, 12 units of Y and 10 units of Z. The minimum requirement of X, Y and Z is 108 units respectively. Product A costs LRs. 20 per unit and product B costs Rs. 40 per unit. Formulate the above as a linear programming problem to minimize the total cost, and solve the problem by using graphical method.

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52. A toy manufacturer produces two types of dolls; a basic version doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one doll of type A. The company have time to make a maximum of 2000 dolls of type A per day, the supply of plastic is sufficient to produce 1500 dolls per day and each type requires equal amount of it. The deluxe version i.e. type B requires a fancy dress of which there are only 600 per day available. If the company makes a profit of RLs. 3 and Rs. 5 per doll, respectively, on doll A and B; how many of each should be produced per day in order to maximize profit? Solve it by graphical method.

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53. An oil company requires 12,000, 20,000 and 15,000 barrels of high-grade, medium grade and low grade oil, respectively. Refinery A produces 100, 300 and 200 barrels per day of high grade, medium grade and low

grade, respectively, while refinery B produces 200,400 and 100 barrels per day of high-grade, medium grade and low grade, respectively. If refinery A costs Rs 400 per day and refinery B costs Rs 300 per day to operate, how many days should each be run to minimize costs while satisfying requirements.

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54. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5,760 to invest and has a space for at most 20 items. A fan costs him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize the profit? Formulate this as a linear programming problem and solve it graphically.

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55. A small manufacturer has employed 5 skilled men and 10 semi - skilled men and makes an article in two qualities-deluxe model and an ordinary model. The making of a deluxe model requires 2 hrs work by a skilled man and 2 hrs work by a semi skilled man. The ordinary model requires 1 hr by a skilled man and 3 hrs by a semi skilled man. By union rules, no man may work more than 8 hrs per day. The manufacture's clear profit on deluxe model is Rs.15 and an ordinary model is Rs. 10. How many of each type should be made in order to maximize his total daily profit.

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56. A company produces two types of good, A and B, that require gold and silver. Each unit of type A requires 3 gm of silver and 1 gm of gold while that of type B requires 1 gm of silver and 2 gm of gold. The company can produce 9 gm of silver and 8 gm of gold. If each unit of type A brings a profit of Rs. 40 and that of type B Rs. 50, find the number of units of each type that the company should produce to maximize the profit. What is the maximum profit?

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57. 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 70 paise and screws B at a profit of Rs 1. 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? Formulate the above LPP and solve it graphically and determine the maximum profit.

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58. 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.

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59. A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 calories. Two foods A and B, are available at a cost of Rs. 4 and Rs. 3 per unit respectively. If one unit of A contains 200 units of vitamin, 1 unit of mineral and 40 calories and one unit of food B contains 100 units of vitamin, 2 units of minerals and 40 calories, find what combination of foods should be used to have the least cost?

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60. A wholesale dealer deals in two kinds, A and B (say) of mixture of nuts. Each kg of mixture A contains 60 grams of a almonds, 30 grams of cashew nuts and 30 grams of hazel nuts. Each kg of mixture B contains 30 grams of almonds, 60 grams of cashew nuts and 180 grams of hazel nuts. The remainder of both mixtures is per nuts. The dealer is contemplating to use mixtures A and B to make a bag which will contain at least 240 grams of almonds, 300 grams of cashew nuts and 540 grams of hazel nuts. Mixture A costs Rs. 8 per kg. And mixture B costs Rs. 12 per kg. Assuming that mixtures a A and B are uniform, use graphical method to determine the number of kg. Of each mixture which he should use to minimise the cost of the bag.

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61. Solve the following liner programming problems by graphical method:

Maximize $Z = 50x + 30y$ Subject to $2x + y \leq 18,\quad 3x + 2y \leq 34$

$x, y \geq 0$

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62. A small manufacturing firm produces two types of gadgets A and B which are first processed in the foundry, the sent to the machine ship for finishing. The number of man hours of labour required in each shop for the production of each unit of A and B and the number of man hours the firm has available per week are as follows: Gadget Foundry Machine – shop A 10 5 B 6 4 Firm's capacity per week 1000 600 The profit the salt A is Rs. 30 per unit as compared with Rs. 20 per unit of B. the problem is to determine the weekly production of gadgets and B, so that the total profit is maximized. Formulate this problem as a LPP.

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63. A firm manufactures 3 products A, B and C. the profits are Rs. 3, 2 and 4 respectively. The firm has 2 machines and below is the required processing time in minutes for each machine on each product. Machine Products A B C M_1 M_2 4 2 3 2 5 4 Machines $M_1 and\ M_2$ have 2000 and

25000 machine minutes respectively. The firm must manufacture 100 As, 200B and 50Cs but not more 150 As. Set up a LPP to maximize the profit.

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64. A rubber company is engaged in producing three types of tyres A, B and C. each type requires processing in two plants, Plant I and Plant II. The capacities of the two plants, in number of tyres per day, are as follows: Plants A B C I 50 100 100 II 60 60 200 The monthly demand for tyre A, B and C is 2500, 3000 and 7000 respectively. If plant I costs Rs. 2500 per day, and plant II costs R. 2500 per day to operate , how many days should each be run per month to minimize cost while meeting the demand? Formulate the problem as LPP.

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65. A manufacturer can produce two products, A and B during a given time period. Each of these products requires four different manufacturing operations: grinding, turning assembling and testing. The

manufacturing requirements in hours per unit of product A and B are given below. A B Grinding Turning Assembling Testing 1 3 6 5 2 1 3 4 The available capacities of these operations in hours for the given time period are: grinding 30' turning 60, assembling 200, testing 200. The contribution to profits is Rs. 20 for each unit of A and Rs. 30 for each unit of B. the firm can sell all that it produces at the prevailing market price. Determine the optimum amount of A and B to produce during the given time period. Formulate this as a LPP.

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66. Evaluate $\int (ax+b)dx$

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67. Evaluate $\int \frac{\log x}{x} dx$

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68. Evaluate $\int \frac{\sin x}{\cos x} dx$

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69. Evaluate $\int \frac{\sec^2 x}{\tan x} dx$

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70. Evaluate $\int \tan x . \sec^2 x dx$

Watch Video Solution

71. Evaluate $\int \sec^2 x dx$

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72. Evaluate $\int \frac{2x}{e^{x^2}} dx$

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73. Evaluate $\int \cot x . \operatorname{cosec}^2 x dx$

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74. Evaluate $\int x^5 + \cos x dx$

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75. Find $\frac{dy}{dx}$ if $2 = 2x + 4y$

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76. Solve each of the following linear programming problems by graphical method. Maximize $Z = 30x + 20y$ Subject to $x + y \leq 8$ $x + 4y \geq 12$ $5x + 8y = 20$ $x, y \geq 0$

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77. Solve each of the following linear programming problems by graphical method. Maximize $Z = 3x_1 + 5x_2$ Subject to $x_1 + 3x_2 \geq 3$ $x_1 + x_2 \geq 2$ $x_1, x_2 \geq 0$

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78. Solve each of the following linear programming problems by graphical method. Maximize $Z = 2x + 3y$ Subjected to constrent $x + y \geq 1$, $10x + y \geq 5, x + 10y \geq 1$ and $x, y \geq 0$

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79. Solve each of the following linear programming problems by graphical method. Maximize $Z = x + y$ Subject to $-2x + y \leq 1, x \leq 2, x + y \leq 3$ $x, y \geq 0$

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80. Solve each of the following linear programming problems by graphical method. Maximize $Z = 3x + 3y$ Subject to the constraints $x - y \leq 1$ $x + y \geq 3\, x, y \geq 0$

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81. Find $\frac{dy}{dx}$ if $y = 5x + x^2$

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82. Show the solution zone of the following inequalities on a graph paper: $5x + y \geq 10\, x + y \geq 6\, x + 4y \geq 12\, x \geq 0, y \geq 0$

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83. Find $\frac{dy}{dx}$ if $y = \sin x - \tan y$

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84. A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 10 units of vitamin C. Foot 'I' contain 2 units/kg of vitamin A and 1 unit/kg of vitamin C while food 'II' contain 1 unit/kg of vitamin A and 2 units/kg of vitamin C. it costs Rs. 5.00 per kg to purchase food 'I' and Rs. 7.000 per kg to produce food 'II'. Determine the minimum cost to such a mixture. Formulate the above as a LPP and solve it.

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85. Find $\frac{dy}{dx}$ if $x - 4y = \cos x$

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86. Find $\frac{dy}{dx}$ if $x = \sin y$

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87. Find $\frac{dy}{dx}$ if $x = \cos y$

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88. Find $\frac{dy}{dx}$ if $2x = \sec y$

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89. One kind of cake requires 300g of flour and 15g of fat, another kind of cake requires 150g of flour and 30g of fat. Find the maximum number of cakes which can be made from 7.5 kg of flour and 600f of fat, assuming that there is no shortage of the other ingredients used in making the cakes. Make it as an L.PP. and solve it graphically.

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90. Find $\frac{dy}{dx}$ if $3x = \cot y$

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91. Find $\frac{dy}{dx}$ if $x = \log y$

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92. A company produces soft drinks that has a contract which requires that a minimum of 80 units of the chemical A and 60 units of the chemical B to go into each bottle of the drink. The chemicals are available in a prepared mix from two different suppliers. Supplier S has a mix of 4 units of A and 2 units of B that costs Rs. 10, the supplier T has a mix of 1 unit of A and 1 unit of B that costs Rs. 4. How many mixes from S and T should the company purchase to honour contract requirement and yet minimize cost?

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93. Find $\frac{dy}{dx}$ if $y = e^{3x}$

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94. Find $\frac{dy}{dx}$ if $x = e^{2y}$

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95. Find $\frac{dy}{dx}$ if $x = 5x^2 + y$

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96. Find $\frac{dy}{dx}$ if $y = x^3 + x^2$

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97. Find $\frac{dy}{dx}$ if $y = x^4 + x$

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98. Find $\frac{dy}{dx}$ if $x = y^2$

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99. Find $\frac{dy}{dx}$ if $3x = y^5$

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100. Find $\frac{dy}{dx}$ if $x^2 = y^2$

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101. Find $\frac{dy}{dx}$ if $x^3 = y^3$

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102. Find $\frac{dy}{dx}$ if $y^4 = x + x^3$

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103. Find $\frac{dy}{dx}$ if $y^3 + x = 5$

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104. A manufacturer produces two types of steel trunks. He has tow machines A and B. For completing, the first types of the trunk requires 3 hours on machine A and 3 hours on machine B, whereas the second type of the trunk requires 3 hours on machine A and 2 hours on machine B. Machines A and B can work at most for 18 hours and 15 hours per day respectively. He earns a profit of Rs. 30 and Rs. 25 per trunk of the first type and the second respectively. How many trunks of each type must he make each day to makes maximum profit?

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105. Find $\frac{dy}{dx}$ if $y^3 = x + x^4$

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106. Find $\frac{dy}{dx}$ if $x = y^2 + 5y$

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107. A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of grinding/cutting machine and a sprayer. It takes 2 hours on the grinding/cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp. It takes one 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? Make an L.P.P. and solve it graphically.

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108. A producer has 30 and 17 units of labour and capital respectively which he can use to produce two of goods X and Y. To produce one unit X, 2 units of labour and 3 units of capital are required. Similarly, 3 units of labour and 1 unit of capital is required to produce one unit of Y. If X and Y are priced at Rs. 100 and Rs. 120 per unit respectively to should be producer use his resources to maximize the total revenue?

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109. Find $\frac{dy}{dx}$ if $x^5 = y + 5x$

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110. A small firm manufactures items A and B. The total number of items that it can manufacture in a day is at the most 24 Item A takes on hour to make while item B takes only half an hour. The maximum time available per day is 16 hours. If the profit on one unit of item A be 300 and that on one unit of item B be 160, how many of each type of item should be produced to maximize the profit? Solve the problem graphically

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111. Find $\frac{dy}{dx}$ if $2x + 3y = 7$

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112. A company sells two different products, A and B. The two products are produced in a common production process, which has a total capacity of 500 man-hours. It takes 5 hours to produce a unit of A and 3 hours to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 70 and

that, for B is 125. If the profit is Rs. 20 per unit for the product A and Rs. 15 per unit for the product B, how many units of each product should be sold to maximize profit?

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113. Find $\frac{dy}{dx}$ if $e^y + \sin y = 5x$

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114. Find $\frac{dy}{dx}$ if $5x - 2y^3 = 80$

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115. Find $\frac{dy}{dx}$ if $e^x + \sin y = \cos y$

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116. Find $\frac{dy}{dx}$ if $2x - 3y = 15$

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117. Find $\frac{dy}{dx}$ if $y = x + 60$

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118. Find $\frac{dy}{dx}$ if $2x = \sin y$

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119. A factory makes tennis rackets and cricket bats. A tennis racket takes 1.5 hours of machine time and 3 hours of craftmans time in its making while a cricket bat takes 3 hours of machine time and 1 hour of craftmans time. In a day, the factory has the availability of not more than 42 hours of machine time and 24 hours of craftsmans time. If the profit on a racket

and on a bat is Rs. 20 and Rs. 10 respectively, find the number of tennis rackets and crickets bats that the factory must manufacture to earn the maximum profit. Make it as an L.P.P. and solve graphically.

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120. Find $\frac{dy}{dx}$ if $3x = \cos y$

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121. Find $\frac{dy}{dx}$ if $5x = \tan y$

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122. A manufacturing company makes two models A and B of a product. Each piece of mode a requires 9 labour hours for fabricating and 1 labour hour for finishing. Each piece of Mode B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricati2 and finishing,

the maximum labour hours available are 180 and 30 respectively. The company makes a profit of Rs. 8000 on each piece of model A and Rs. 12000 on each piece of Model B. How many pieces of Model A and Model B should be manufactured per week to realise a maximum profit? What is the maximum profit per week?

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123. Find $\frac{dy}{dx}$ if $5x + 7y = 77$

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124. Find $\frac{dy}{dx}$ if $3x - 6y = 50$

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125. Find $\frac{dy}{dx}$ if $x - y = \sin y$

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126. 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. However, at least 4 times as many passengers prefer to travel by economy class than by the executive class. Determine how many tickets of each type must be sold in order to maximize the profit for the airline. What is the maximum profit?

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127. Find $\frac{dy}{dx}$ if $10x + 2y = 200$

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128. The solution set of the inequation $2x + y > 5$ is

A. (A) Half Plane that Contains the Origin

B. (B) Open Half Plane Not Containing the Origin

C. (C) Whole Xy-plane Except the Points Lying on the Line 2x + Y = 5

D. (D) None of these

Answer: null

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129. Objective function of a LLP is

(A) a constraint

(B) a function to be optimized

(C) a relation between the variables

(D) none of these

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130. Which of the following is not a convex set? $\{(x, y): 2x + 5y < 7\}$ b. $\{(x, y)x^2 + y^2 \leq 4\}$ c. $|x| = 5\}$ d. $\{(x, y): 3x^2 + 2y^2 \leq 6\}$

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131. Find $\frac{dy}{dx}$ if $2x - 2y = \sin y$

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132. The maximum value of $Z = 4x + 2y$ subjected to the constraints $2x + 3y \leq 18,\ x + y \geq 10; x,\ y \geq 0$ is a.36 b. 40 c. 20 d. none of these

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133. The optimal value of the objective function is attained at the points A)Given by intersection of inequations with the axes only B)Given by intersection of inequations with the axes only C)Given by corner points of the feasible region D)None of these

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134. The maximum value of $Z = 4x + 3y$ subjected to the constraints $x + 2y \geq 160,\ 5x + 2y \geq 200,\ x + 2y \geq 80;\ x,\ y \geq 0$ is a.320 b. 300 c. 230 d. none of these

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135. Find $\frac{dy}{dx}$ if $3x - 4y = \tan x$

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136. The objective function $Z = 4x + 3y$ can be maximized subjected to the constraints $3x + 4y \leq 24,\ 8x + 6y \leq 48,\ x \leq 5,\ y \leq 6; x,\ y \geq 0$ a. at only one point b. at two points only c. at an infinite number of points d. none of these

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137. If the constraints in a linear programming problem are changed

A. a. The problem is to be re evaluated

B. b. Solution is not defined

C. c. The objective function has to be modified

D. d. The change in constraints is ignored

Answer: null

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138. Which of the following statements is correct?

A. A) Every LPP admits an optimal solution

B. B) A LPP admits unique optimal solution

C. C) If a LPP admits two optimal solutions it has an infinite number of optimal solutions

D. D) a LPP is not a converse set

Answer: null

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139. Find $\frac{dy}{dx}$ if $4x - 4y = \sin y$

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140. The region represented by the inequation system $x,\ y \geq 0,\ y \leq 6,\ x + y \leq 3$ is (a) Unbounded in first quadrant (b)Unbounded in first and second quadrants (c)Bounded in first and second quadrants (d)None of these

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141. The point at which the maximum value of $x + y$ subject to the constraints $x + 2y \leq 70,\ 2x + y \leq 95,\ x,\ y \geq 0$ is obtained is a. (30,25) b. (20,35) c. (35,20) d. (40,15)

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142. The value of objective function is maximum under linear constraints (a) At the centre of feasible region (b)At (0,0) (c)At any vertex of feasible region (d)The vertex which is maximum distance from (0,0)

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143. The corner points of the feasible region determined by the following system of linear inequalities: $2x + y \leq 10,\ x + 3y \leq 15,\ x,\ y \geq 0\ are\ (0, 0),\ (5, 0), (3,\ 4) and\ (0, 5) \dot{L}et$. Condition on $p\ and\ q$ so that the maximum of Z occurs at both (3,4) and (0,5) is $p = q$ b. $p = 2q$ c. $p = 3q$ d. $q = 3p$

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144. Find the area of the region $\left\{(x, y) : y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\right\}$

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