MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

LINEAR PROGRAMMING

Solved Examples

1. Maximize $z = 6x + 4y$, subject to $x \leq 2, x + y \leq 3, -2x + y \leq 1, x \geq 0, y \geq 0.$

Also , find maximum value of z.

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2. Maximize $z = 10x + 25y$, subject to $x \leq 3, y \leq 3, x + y \leq 5, x \geq 0, y \geq 0.$

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3. Minimize $z = 6x + 2y$, subject to $5x + 9y \leq 90, x + y \geq 4, y \leq 8, x \geq 0, y \geq 0.$

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4. Minimize $z = x + 2y$, subject to $x + 2y \geq 50$, $2x - y \leq 0, 2x + y \leq 100, x, y \geq 0.$

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5. Minimize $z = 6x + 4y$, subject to

$3x + 2y \geq 12, x + y \geq 5, 0 \leq x \leq 4, 0 \leq y \leq 4.$

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6. Maximize $z = x_1 + x_2,$ subject to

$x_1 + x_2 \leq 10, 3x_2 - 2x_1 \leq 15 x_1 \leq 6, x_1, x_2 \geq 0.$

Show that the maximum value of z occurs at more than two points. What is your conclusion ?

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7. A company manufactures bicycles and tricycles, each of which must be processed through two machines A and B. Machine A has maximum of 120 hours available and machine B has a maximum of 180 hours available. Manufacturing a bicycle requires 6 hours on machine A and 3 hours on machine B. Manufacturing a tricycle requires 4 hours on machine A and 10 hours on machine B.

If profits are ₹ 180 for a bicycle and ₹ 220 for a tricycle, determine the number of bicycles and tricycles that should be manufactured in order to maximize the profit.

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8. A diet of sick person contains at least 48 units of vitamin A and 64 uints of vitamin B. Two foods F_1 and F_2 are available . Food F_1 costs Rs. 6 per unit and food F_2 costs Rs. 10 per unit. One unit of food F_1 contains 6 units of vitamin A and 7 units of vitamin B. One unit of of food F_2 contain 8 units of vitamin A and 12 units of vitamin B. Formulate the LPP, for the minimum cost for the diet that consists of mixture of these two foods and also meeting the minimal nutrition requirements

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Examples For Practice

1. Maximize $z = 4x + 5y$, subject to

$2x + y \geq 7, 2x + 3y \leq 15, x \leq 3, x \geq 0, y \geq 0$

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2. Maximize $z = 3x_1 - x_2$, subject to

$2x_1 + x_2 \geq 2, x_1 + 3x_2 \leq 2, x_2 \leq 2, x_1 \geq 0, x_2 \geq 0$

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3. Maximize $z = 4x + 6y$,subject to

$3x + 2y \leq 12, x + y \geq 4, x \geq 0, y \geq 0$

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4. Minimize $z = 7x + y$, subject to

$5x + y \geq 5, x + y \geq 3, x \geq 0, y \geq 0.$

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5. Minimize $z = 20x + 10y$, subject to

$x + 2y \leq 40, 3x + y \geq 30, 4x + 3y \geq 60, x \geq 0, y \geq 0$

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6. Maximize $z = 6x + 4y$, subject to

$2x + 3y \leq 30, 3x + 2y \leq 24, x + y \geq 3, x \geq 0, y \geq 0.$

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7. A carpenter has 45, 40 and 25 running feet of teak wood, plywood and rosewood respectively. A table requires 2, 1 and 1 running feet and a chair requires 1, 2, 1 running feet of teak wood, plywood and rosewood respectively. If a table would sell for ₹ 4800 per unit and a chair for ₹ 1600 per unit, how

many tables and chairs should the carpener make and sell in order to obtain maximum income out of his stock of wood ?

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8. 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 go into each bottle of the drink. The chemicals are available in prepared mix packets from two different suppliers. Supplier S had a packet of mix of 4 units of A and 2 units of B that costs Rs.10. The supplier T has a packet of mix of 1 unit of A and 1 unit of B costs

Rs.4. How many packets of mixed from S and T should the company purchase to honour the contract requirement and yet minimize cost? Make a LPP and solve graphically.

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