Problems on Linear Programming

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TIP – FTP – UB

Soal 1

- The Munchies Cereal Company makes a cereal from several ingredients. Two of the ingredients, oats and rice, provide vitamins A and B. The company wants to know how many ounces of oats and rice it should include in each box of cereal to meet the minimum requirements of 48 milligrams of vitamin A and 12 milligrams of vitamin B while minimizing cost. An ounce of oats contributes 8 milligrams of vitamin A and 1 milligram of vitamin B, whereas an ounce of rice contributes 6 milligrams of vitamin A and 2 milligrams of vitamin B. An ounce of oats costs $0.05, and an ounce of rice costs $0.03.
- Formulate a linear programming model for this problem and solve using the simplex method.

Soal 2

- A company makes product 1 and product 2 from two resources. The linear programming model for determining the amounts of product 1 and 2 to produce ($x1$ and $x2$) is

  maximize $Z = 8x1 + 2x2$ (profit, $)

  subject to

  $4x1 + 5x2 \leq 20$ (resource 1, lb)

  $2x1 + 6x2 \leq 18$ (resource 2, lb)

  $x1, x2 \geq 0$

- Solve this model using the simplex method.

Soal 3

- A company produces two products that are processed on two assembly lines. Assembly line 1 has 100 available hours, and assembly line 2 has 42 available hours. Each product requires 10 hours of processing time on line 1, while on line 2 product 1 requires 7 hours and product 2 requires 3 hours. The profit for product 1 is $6 per unit, and the profit for product 2 is $4 per unit.
- Formulate a linear programming model for this problem and solve using the simplex method.

Soal 4

- Solve the following model using the simplex method.

minimize $Z = 0.06x1 + 0.10x2$

subject to

$4x1 + 3x2 \geq 12$

$3x1 + 6x2 \geq 12$

$5x1 + 2x2 \geq 10$

$x1, x2 \geq 0$

Soal 5

- Solve the following model using the simplex method.

minimize $Z = 8x1 + 2x2 + 7x3$

subject to

$2x1 + 6x2 + x3 = 30$

$3x2 + 4x3 \geq 60$

$4x1 + x2 + 2x3 \leq 50$

$x1 + 2x2 \geq 20$

$x1, x2, x3 \geq 0$

Soal 6

- Solve this model using the simplex method. Y is your last student number (NIM). If your last student number is 0 then Y is 10.

  minimize $Z = 3x1 + Yx2$ (cost, $)

  subject to

  $3x1 + 2x2 \leq 18$ (production time, days)

  $x1 + x2 \geq 5$ (contract, tons)

  $x1 \leq 4$ (cherry, tons)

  $x2 \leq 7$ (oak, tons)

  $x1, x2 \geq 0$