TD 01

Question 01:

- The goal:

How much K of feed 1 and feed 2 to meet the minimum stock requirements.

- Variables:

x : Kgs of feed 1

y : Kgs of feed 2

- Objective function

Min $Z = 160x + 140y$

- Define contraints:

- for say A:

$10x + 4y \geq 124$

- for corn B:

$3x + 5y \geq 60$

$x, y \geq 0$

Question 02:

- The goal:

Which combination of A, B and C will provide a suitable solution at minimum cost

- Variables:

a : amount of A used

b : amount of B used

c : amount of C used

- Objective function

Min $Z = 1,6a + 0,5b + 1,4c$

- Define constraints:

- for Antifreeze:

$60a + 18b + 75c \geq 50$

- for anticorrosion:

$10a + 3b + 0c \geq 5$

- for 1 gallon:

$a + b + c = 1$

$a, b, c \geq 0$

Question 03:

- The goal:

How many hour of process 1 and 2 to meet the demands and minimize costs

- Variables:

x : hours of process 1

y : hours of process B

- Objective function:

Min $Z = 25x + 20y$

- Define constraints:

- Units of A:

$3x + 5y \geq 90$

- Units of B:

$6x + 5y \geq 120$

$x, y \geq 0$

Question 04:

- The goal

How many items of X and Y to produce in order to maximize profit

- Variables

x: number of item X

y: number of item y

- Objective function:

$$\text{Max } Z = 20x + 30y - 10\left(\frac{13}{60}x + \frac{19}{60}y\right) - 2\left(\frac{20}{60}x + \frac{29}{60}y\right)$$

- Define Constraint:

- Machine time:

$$13x + 19y \leq 60 \times 40$$

- Craftsmen time:

$$20x + 29y \leq 60 \times 35$$

- Items per week:

$$x \geq 10$$

$$x, y \geq 0$$

Question 05:

- The goal:

How much to use of high quality chili and low quality chilis to maximize revenue

- Variable

X_{wa}: Kgs of A quality chilis used in whole jar

X_{wb}: Kgs of B quality chili used in whole jar chili

X_{pa}: Kgs of A quality chili used in paste chili

X_{pb}: Kgs of B quality chili used in paste chili

- Objective function:

$$\text{Max } Z = 800(X_{wa} + X_{wb}) + 500(X_{pa} + X_{pb})$$

- Constraints:

- A quality chili

$$X_{wa} + X_{pa} \leq 5000$$

- B quality chili

$$X_{wb} + X_{pb} \leq 10000$$

- Whole jar chili

$$\frac{X_{wa}}{X_{wa} + X_{wb}} \geq 0,8$$

$$\Rightarrow 0,2X_{wa} - 0,8X_{wb} \geq 0$$

- Chili paste:

$$\frac{X_{pa}}{X_{pa} + X_{pb}} \geq 0,1$$

$$\Rightarrow 0,9X_{pa} - 0,1X_{pb} \geq 0$$

$$X_{wa}, X_{wb}, X_{pa}, X_{pb} \geq 0$$

Question 06

- The goal:

minimize the distribution cost,

- Variables:

X_{12}: road between O_1 and P_1

X_{12} : the road between O_1 and D_2

X_{13} : the road between O_1 and D_3

X_{21} : the road between O_2 and D_1

X_{22} : the road between O_2 and D_2

X_{23} : the road between O_2 and D_3

- Objective function

$$\text{Min } Z = 8x_{11} + 6x_{12} + 10x_{13} + 10x_{21} + 4x_{22} + 9x_{23}$$

- Constraints

$$x_{11} + x_{12} + x_{13} = 2000$$

$$x_{21} + x_{22} + x_{23} = 2500$$

$$x_{11} + x_{21} = 1500$$

$$x_{12} + x_{22} = 2000$$

$$x_{13} + x_{23} = 1000$$

$$x_{11}, x_{12}, x_{13}, x_{21}, x_{22}, x_{23} \geq 0$$