

20-2 = 18

Submission deadline: 03 Dic, 20:10

- Write your solution (images) and inside the answers folder in order to generate a single PDF file. Replace the image files that are already included in the project. Do not change the file name.
- Read the questions carefully and write your answers clearly. Answers that are not legible and that doesn't follow the format will not have any score.

Outcomes:

- a. Apply appropriate mathematical and related knowledge to computer science.
- b. Analyze problems and identify the appropriate computational requirements for its solution.

A. Simplex Method - Maximization Problem

Use the Simplex Method to find the optimum value in the following problems.

Simplex Method (standard form)

Problem 1 (Outcome a) - 4 points

1. Transform inequalities into equations by adding slack variables
2. Construct augmented matrix
3. Select the most negative entry in the last row and use it to choose a pivot:
 - The column is guided by the most negative entry, without considering the values column
 - The row is guided by the least non-negative ratio.
4. Use Gauss-Jordan elimination using the selected pivot
5. If all entries in the last row are positive or zero, stop. Otherwise, iterate again.

Maximize $z = 2x_1 - x_2 + 2x_3$

Subject to constraints:

- $2x_1 + x_2 \leq 10$
- $x_1 + 2x_2 - 2x_3 \leq 20$
- $x_2 + 2x_3 \leq 5$

Where $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

Write your answer here. Attach
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folder

B. Simplex Method - Minimization Problem

Problem 2 (Outcome a) - 5 points

Find the minimum value of the function: $w = 3x_1 + 2x_2$

Subject to constraints:

- $2x_1 + x_2 \geq 6$
- $x_1 + x_2 \geq 4$

Where $x_1 \geq 0$, $x_2 \geq 0$

Write your answer here. Attach
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C. Simplex Method - Minimization Problem and Mixed Constraints

One technique to solve a minimization problem with mixed constraints is to convert the problem into a maximization problem with mixed constraints by multiplying each coefficient of the objective function by -1.

Problem 3 (Outcome a) - 5 points

Find the minimum value of the function: $w = 4x_1 + 2x_2 + x_3$

Subject to constraints:

- $2x_1 + 3x_2 + 4x_3 \leq 14$
- $3x_1 + x_2 + 5x_3 \geq 4$
- $x_1 + 4x_2 + 3x_3 \geq 6$

Where $x_1 \geq 0$, $x_2 \geq 0$, $x_3 \geq 0$

Write your answer here. Attach
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D. Simplex Method - Mining Company

Problem 4 (Outcome a, b) - 6 points

A mining Company has 2 locations in different parts of the country where gold, silver and bronze are extracted. Location 1 costs S/. 20,000 per day to operate and Location 2 costs S/. 25,000 per day to operate. In the table below you will find the amount of minerals that are extracted by each location per day.

Mineral	Location 1	Location 2
Bronze	400kg	300kg
Silver	300kg	400kg
Gold	200kg	500kg

The company has the goal of at least extract 25,000 kg of bronze, 27,000 kg of silver and 30,000 kg of gold. How many days each location should run to minimize its costs and fulfill its goal?

Write your answer here. Attach
only one picture to replace this
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