CCAI-311:

Optimization and Regression

PROJECT

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Problem description

A bakery wastes a quantity of flour, sugar, butter, and eggs every month

In the following quantities:

• Flour 50,00 g

• Sugar 25,00 g

• Butter 20,00 g

• Eggs 1000 g

The factory manager thought of utilizing the wasted quantities to produce other products to increase the factory profits.

He is thinking of deciding about adding two additional products: biscuits and cupcakes

Knowing that the quantity needed to produce one box of biscuits is:

200 grams of flour

100 grams of sugar

100 grams of butter

20 grams of eggs

However, the quantity needed to produce one cupcake box is:

300 grams of flour

200 grams of sugar

200 grams of butter

30 grams of eggs

The price of a box of biscuits is $5, and the price of a box of cupcakes is $8

How many boxes does the factory need to produce biscuits and cupcakes to achieve the highest profits?

Variables:

X: - represents the number of biscuit boxes.

Y: - represents the number of cupcake boxes.

Domain: all integer values that satisfy the constraints

Goal: Maximize the factory profits

Table of information

	Biscuit box x	Cupcake box y	Constraints $\leq$
Price	5$	8$	
Floor	200	300	50,000
Sugar	100	200	25,000
Butter	100	200	20,000
Egg	20	30	1000

Constraints:

$200x + 300y \leq 50,000$

$100x + 200y \leq 25,000$

$100x + 200y \leq 20,000$

$20x + 30y \leq 1000$

$x, y \geq 0$

Objective function:

P= 5x + 8y

So, we are attempting to find the number of boxes of the two products (biscuits and cupcakes) that maximize the factory profits

Mathematical representation:

Maximize

$\qquad$ P= 5x + 8y

Subject to

$\qquad 2x + 3y \leq 500$

$\qquad x + 2y \leq 250$

$\qquad x + 2y \leq 200$

$\qquad 2x + 3y \leq 100$

$\qquad x, y \geq 0$