Ralph's New Diet

Ralph Edmund loves steaks and potatoes. Therefore, he has decided to go on a steady diet of only these two foods for all his meals. Ralph realizes that this isn't the healthiest diet, so he wants to make sure that eats the right quantities of the two foods to satisfy some key nutritional requirements. He has obtained the nutritional and cost information (shown in the next slide).

Ralph wishes to determine the number of daily servings of steak and potatoes that will meet these requirements at a minimal cost.

Data

Nutritional and cost information

Ingredient	Grams of Ingredient per Serving		Daily Requirement (grams)
	Steak	Potatoes	
Carbohydrates	5	15	≥ 50
Protein	20	5	≥ 40
Fat	15	2	≤ 60
Cost per serving	$4	$2	

Variables & Equations

Decision variables:

x_1: number of servings of steak per day

x_2: number of servings of potatoes per day

Objective Function:

Minimize the total cost/day

$Z = 4x_1 + 2x_2$

Constraints:

Ingredient	Grams of Ingredient per Serving		Daily Requirement (grams)
	Steak	Potatoes	
Carbohydrates	5	15	≥ 50
Protein	20	5	≥ 40
Fat	15	2	≤ 60
Cost per serving	$4	$2	

Carbohydrates: $5x_1 + 15x_2 \geq 50$

Protein: $20x_1 + 5x_2 \geq 40$

Fat: $15x_1 + 2x_2 \leq 60$

Standard LP Model

Minimize $Z = 4x_1 + 2x_2$

Subject to the restrictions

$5x_1+15x_2 \geq 50$

$20x_1+ 5x_2 \geq 40$

$15x_1+ 2x_2 \leq 60$

and

$x_1, x_2 \geq 0$

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Let's go to Excel and use Solver!

- Problem 2.xlsx