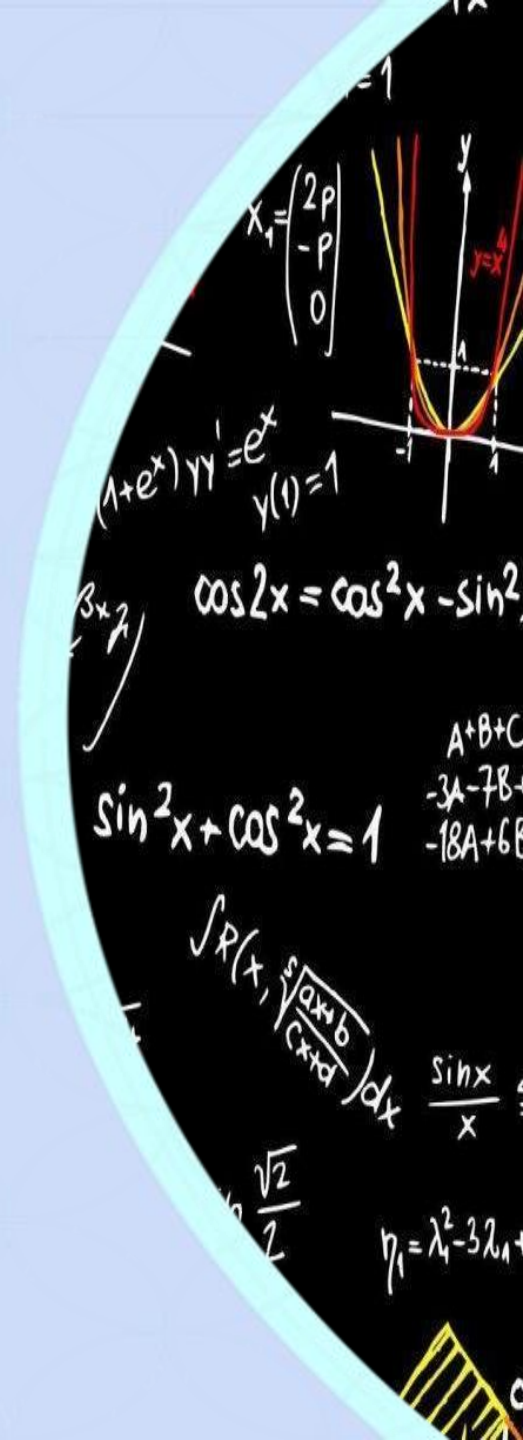


Mathematical Optimization Algorithms

Lab 1: Linear Programming



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Operating Income Maximization for a Tea Producer Company

Scenario:

- You are the Operations Manager at a tea production company, **Namaste Ikigai**, which specializes in producing and selling various types of teas across Europe.
- Your goal is to maximize the company's operating income for the upcoming fiscal year 2025.
- To achieve this, you need to determine the optimal production and distribution plan for different types and sizes of tea boxes to various countries, while considering production capacities, costs, and market demand.

Objective:

- Formulate and solve a Linear Programming problem to maximize **Namaste Ikigai** operating income by determining the optimal quantities of each tea product to produce and distribute to each country.

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Selling Price:

- Green Tea: 50g box (GT50) at 6 USD per box, 100g box (GT100) at 10 USD per box
- Black Tea: 50g box (BT50) at 7 USD per box, 100g box (BT100) at 12 USD per box
- White Tea: 50g box (WT50) at 9 USD per box, 100g box (WT100) at 16 USD per box
- Red Tea: 50g box (RT50) at 8 USD per box, 100g box (RT100) at 14 USD per box

Buying Price:

- Green Tea 100g 3.5 USD
- Black Tea: 100g 4.5 USD
- White Tea: 100g 5.5 USD
- Red Tea 100g 5 USD

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Markets:

- The products are sold in the following countries through their main cities:
- Portugal, Spain, France, Italy, Germany, Poland

Distribution Cost

Country	USD/box
Portugal	0.5
Spain	0.4
France	0.6
Italy	0.7
Germany	0.8
Poland	1.0

Demand Forecast:

Country	GT50	GT100	BT50	BT100	WT50	WT100	RT50	RT100
Portugal	100	80	90	70	50	40	60	50
Spain	150	120	130	110	80	60	100	90
France	200	170	180	160	100	90	120	110
Italy	130	110	120	100	70	60	90	80
Germany	180	160	170	150	90	80	110	100
Poland	120	100	110	90	60	50	80	70

Operating Income Maximization for a Tea Producer Company

Additional Information:

- Production Cost is 1 USD per box (regardless of type and size)
- Marketing Cost is Fixed annual cost of 400 k USD
- Fixed annual cost of 4 M USD (not dependent on production quantity)
- The factory in Girona can produce a total of 2 million boxes per year.
- Total raw tea available per year is Green Tea: 25,000,000 grams, Black Tea: 30,000,000 grams, White Tea: 15,000,000 grams, Red Tea: 20,000,000 grams,
- The company wants to ensure that at least 10% of the total production is allocated to each type of tea to maintain market presence.

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