



# Hands-On Learning Activity: Advanced Optimization in Financial Modeling

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Hands-On Learning activity focuses on using AI-based optimization to improve financial performance. You will simulate dynamic decision-making with constraints and compare optimization strategies using reinforcement learning concepts.



# Objective



To apply optimization techniques in financial modeling using Generative AI, reinforcement learning, and scenario-based decision rules.



## Instructions



- ▶ Use Excel or Google Sheets for models and decision tables, and document your strategy notes in a Word or slide file

## Step 1: Identify Optimization Goal and Constraints



### ▶ Scenario:

A company wants to maximize profit from three product lines under limited marketing and inventory budgets three product lines under limited marketing and inventory budgets

**➤ Product A:**

Profit \$50/unit | Product B: \$30/unit | Product C: \$20/unit

**➤ Constraints:**

Total marketing budget = \$25,000

Inventory capacity = 1,000 units

Define a goal (e.g., Maximize total profit) and list decision variables.

## Step 2: Build a Simple Optimization Model



### Assign marketing and inventory cost per unit:

- A = \$20 marketing, 2 units inventory
- B = \$10 marketing, 1 unit inventory
- C = \$5 marketing, 1 unit inventory

Build a spreadsheet model to determine optimal number of units for each product under constraints.

Use solver or manual trial to maximize profit.

## Step 3: Create a Decision Table for Reinforcement Learning



### Simulate different market responses with rewards:

- High Demand:  $A = 2$ ,  $B = 1.5$ ,  $C = 1$
- Medium Demand:  $A = 1.5$ ,  $B = 1$ ,  $C = 0.8$
- Low Demand:  $A = 1$ ,  $B = 0.7$ ,  $C = 0.5$

Create a decision table that recommends unit mix based on demand condition. Include logic or rules for how the AI could 'learn' to allocate resources over time.

## Step 4: Compare Optimization Approaches



Write a short comparison:

- Traditional optimization (e.g., Solver-based linear models)
- AI-driven optimization (e.g., using reinforcement learning rewards)

Note differences in input, flexibility, and adaptability.





## Step 5: Reflect on Real-World Use Cases

Write 6–8 sentences on:

- How might AI-powered optimization improve financial decision-making in areas like pricing, inventory, or marketing?
- What are the risks or challenges with relying on AI in this context?
- When would you choose human-led versus AI-led optimization?