

In-Class Exercise: The Carpenter's Dilemma

Time Limit: 15 Minutes

Tools Allowed: Pen & Paper, Excel, Calculator, Python, AI, or Guesswork.

The Scenario

You are the production manager of a boutique furniture workshop. You produce two high-end products: **Oak Tables** and **Oak Chairs**.

Your goal is to determine the weekly production plan that maximizes your **Total Profit**.

The Data

1. Financials

- **Tables:** Profit is **\$100.00** per unit.
- **Chairs:** Profit is **\$30.00** per unit.

2. Resource Constraints

You have limited supplies for this week:

- **Wood:** You have **200 board-feet** of oak available.
 - One Table uses **20** board-feet.
 - One Chair uses **5** board-feet.
- **Labor:** You have **40 hours** of skilled labor available.
 - One Table takes **5** hours to build.
 - One Chair takes **2** hours to build.

3. The "Marketing" Constraint (Read Carefully)

Because customers typically buy dining sets, you have a strict policy:

- For every **1 Table** you produce, you must produce **at least 4 Chairs**.
- Note: You are allowed to produce extra chairs (spare chairs are sold individually), but you cannot produce fewer than 4 chairs per table.

4. The "Physical" Constraint

- You cannot sell half a table or half a chair. All production numbers must be **whole numbers (Integers)**.

Your Task

Answer the following questions:

1. **The Plan:** How many Tables and how many Chairs should you make?
2. **The Result:** What is your maximum Total Profit?

3. **The Logic:** If you used a tool (like AI or Excel), did it give you a valid answer? If you guessed, how did you verify your answer is actually feasible?