# **Case Study: Cost Optimization for a Manufacturing Company**

The company needs to manufacture **two products** while utilizing two available resources efficiently. Each product requires a certain amount of **Resource A** and **Resource B**, and there are minimum resource requirements that must be met.

**Given Data**

* **Cost per unit of x11​** = **$3**
* **Cost per unit of x2** = **$5**
* The company aims to **minimize total production cost**.

**Primal Problem (Minimize)**:

* + - **Minimize:** **Z=3x1+5x2**

**Subject to**:

* x1+2x2≥8(Resource A constraint: at least 8 units)
* 2x1+x2≥6(Resource B constraint: at least 6 units)
* x1,x2≥0(Non-negativity constraints)
* 3x1 and 5x2 are costs per unit for products x1​ and x2​.
* The constraints ensure minimum resource usage.

**Instructions for Students**

**Objective**

1. **Formulate the dual problem** based on the given primal problem.
2. Solve both the primal and dual problems using graphical methods or linear programming solvers **(Python).**
3. **Interpret the results** and explain the economic meaning of the optimal solution.