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# CodTech Internship Task-4
# Optimization Model using Linear Programming & PuLP

# 🎯 Problem Statement:
# A furniture company produces chairs and tables.
# Each chair needs: 3 units of wood, 2 hours labor → ₹50 profit
# Each table needs: 5 units of wood, 4 hours labor → ₹80 profit
# Max resources: 200 units of wood, 160 hours of labor
# Objective: Maximize profit

# STEP 1: Install PuLP (if not installed)
!pip install pulp

# STEP 2: Import PuLP
from pulp import LpMaximize, LpProblem, LpVariable, value

# STEP 3: Define problem
model = LpProblem("Furniture_Profit_Maximization", LpMaximize)

# STEP 4: Decision variables
chairs = LpVariable("Chairs", lowBound=0, cat='Integer')
tables = LpVariable("Tables", lowBound=0, cat='Integer')

# STEP 5: Objective function (maximize profit)
model += 50 * chairs + 80 * tables, "Total Profit"

# STEP 6: Constraints
model += 3 * chairs + 5 * tables <= 200, "Wood Constraint"
model += 2 * chairs + 4 * tables <= 160, "Labor Constraint"

# STEP 7: Solve model
model.solve()

# STEP 8: Show results
print("Status:", model.status)
print("Chairs to produce:", chairs.varValue)
print("Tables to produce:", tables.varValue)
print("Maximum Profit: ₹", value(model.objective))
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Collecting pulp
  Downloading pulp-3.2.1-py3-none-any.whl.metadata (6.9 kB)
Downloading pulp-3.2.1-py3-none-any.whl (16.4 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 16.4/16.4 MB 31.2 MB/s eta 0:00:00
Installing collected packages: pulp
Successfully installed pulp-3.2.1
Status: 1
Chairs to produce: 65.0
Tables to produce: 1.0
Maximum Profit: ₹ 3330.0
```