Maximize Profit in Product Manufacturing

from scipy.optimize import linprog

**Example 1**

# Objective function coefficients (maximize profit)

c = [-20, -30] # Negative for maximization

# Inequality constraints

A = [[2, 1], # Labor constraint

[1, 2]] # Raw material constraint

b = [100, 80]

# Bounds for decision variables

x\_bounds = (0, None)

y\_bounds = (0, None)

# Solve the linear programming problem

result = linprog(c, A\_ub=A, b\_ub=b, bounds=[x\_bounds, y\_bounds], method='highs')

# Output

print("Optimal number of Product A:", round(result.x[0]))

print("Optimal number of Product B:", round(result.x[1]))

print("Maximum Profit:", -round(result.fun))

from scipy.optimize import linprog

**Example 2**

# Objective function: minimize transportation cost

c = [4, 5, 6, 3]

# Constraints

A = [[1, 1, 0, 0], # Warehouse A capacity

[0, 0, 1, 1], # Warehouse B capacity

[1, 0, 1, 0], # Market X demand

[0, 1, 0, 1]] # Market Y demand

b = [70, 50, 60, 50]

# Solve the problem

result = linprog(c, A\_eq=A, b\_eq=b, bounds=(0, None), method='highs')

# Output

print("Minimum Transportation Cost:", round(result.fun))

print("Units from A to X:", round(result.x[0]))

print("Units from A to Y:", round(result.x[1]))

print("Units from B to X:", round(result.x[2]))

print("Units from B to Y:", round(result.x[3]))

**Example 3**

from scipy.optimize import linprog

# Objective function: minimize cost

c = [3, 5]

# Constraints

A = [[-500, -700], # Calories constraint

[-30, -20]] # Protein constraint

b = [-2000, -50]

# Solve the problem

result = linprog(c, A\_ub=A, b\_ub=b, bounds=(0, None), method='highs')

# Output

print("Minimum Cost:", round(result.fun))

print("Units of Food A:", round(result.x[0]))

print("Units of Food B:", round(result.x[1]))

**Example 4**

from scipy.optimize import linprog

# Objective function: minimize risk

c = [5, 10] # Risk per unit investment

# Constraints

A = [[-8, -12], # Return constraint

[1, 1]] # Total investment

b = [-10000, 100000]

# Solve the problem

result = linprog(c, A\_eq=A, b\_eq=b, bounds=(0, None), method='highs')

# Output

print("Minimum Risk:", round(result.fun))

print("Investment in Stock A:", round(result.x[0]))

print("Investment in Stock B:", round(result.x[1]))