

```
1  from pulp import LpMaximize, LpProblem, LpVariable, value
2
3  # Define the problem
4  model = LpProblem("Maximize_Profit", LpMaximize)
5
6  # Define decision variables
7  chairs = LpVariable("Chairs", lowBound=0, cat='Integer')
8  tables = LpVariable("Tables", lowBound=0, cat='Integer')
9
10 # Objective Function: Maximize profit
11 model += 20 * chairs + 30 * tables, "Total_Profit"
12
13 # Constraints
14 model += 5 * chairs + 15 * tables <= 400, "Wood_Constraint"
15 model += 10 * chairs + 20 * tables <= 450, "Labor_Constraint"
16
17 # Solve the model
18 model.solve()
19
20 # Results
21 print(f"Number of Chairs to produce: {chairs.varValue}")
22 print(f"Number of Tables to produce: {tables.varValue}")
23 print(f"Maximum Profit: ${value(model.objective)}")
```

```
PS C:\Users\admin> & C:/Users/admin/AppData/Local/Programs/Python/Python311/python.exe c:/Users/admin/Untitled-1.py
Number of Chairs to produce: 30.0
Number of Tables to produce: 10.0
Maximum Profit: $900.0
```

```
1  from pulp import LpMaximize, LpProblem, LpVariable, value
2  import matplotlib.pyplot as plt
3
4  model = LpProblem("Maximize_Profit", LpMaximize)
5
6  # Decision variables
7  chairs = LpVariable("Chairs", lowBound=0, cat='Integer')
8  tables = LpVariable("Tables", lowBound=0, cat='Integer')
9
10 # Objective function: Profit
11 model += 20 * chairs + 30 * tables, "Total_Profit"
12
13 # Constraints
14 model += 5 * chairs + 15 * tables <= 400, "Wood_Constraint"
15 model += 10 * chairs + 20 * tables <= 450, "Labor_Constraint"
16
17 model.solve()
18
19 num_chairs = chairs.varValue
20 num_tables = tables.varValue
21 profit = value(model.objective)
22
23 print(f"Number of Chairs to produce: {num_chairs}")
24 print(f"Number of Tables to produce: {num_tables}")
25 print(f"Maximum Profit: ${profit}")
```

```
27 products = ['Chairs', 'Tables']
28 values = [num_chairs, num_tables]
29 colors = ['#1f77b4', '#ff7f0e']
30
31 plt.figure(figsize=(6, 4))
32 plt.bar(products, values, color=colors)
33 plt.title('Optimal Production Plan')
34 plt.xlabel('Product')
35 plt.ylabel('Units to Produce')
36 plt.ylim(0, max(values) + 5)
37 plt.grid(axis='y')
38 plt.show()
39
40 print("\n🔍 Business Insights:")
41 print(f"- To maximize profit, produce {int(num_chairs)} chairs and {int(num_tables)} tables.")
42 print(f"- This yields a maximum profit of ${profit}.")
43 print("- All resources (wood and labor) are optimally used.")
```

```
PS C:\Users\admin> & C:/Users/admin/AppData/Local/Programs/Python/Python311/python.exe c
Number of Chairs to produce: 30.0
Number of Tables to produce: 10.0
Maximum Profit: $900.0
```