Assignment_2

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Objective: Maximize profit (Z) by determining the production quantities of three product sizes at three plant locations.

Objective function: Z = 420(L1 + L2 + L3) + 360(M1 + M2 + M3) + 300(S1 + S2 + S3)

Constraints:

1. Production capacity constraints

2. In-process storage space constraints

3. Sales forecasts constraints

```
# Load the necessary R library for LP problem solving
library(lpSolve)

# Define the coefficients of the objective function (profit contributions of each product size)
profit_contributions <- c(420, 360, 300, 420, 360, 300, 420, 360, 300)

# Define the constraints matrix
constraints_matrix <- matrix(c(
  1, 1, 1, 0, 0, 0, 0, 0, 0,
  0, 0, 0, 1, 1, 1, 0, 0, 0,
  0, 0, 0, 0, 0, 0, 1, 1, 1,
  20, 15, 12, 0, 0, 0, 0, 0, 0,
  0, 0, 0, 20, 15, 12, 0, 0, 0,
  0, 0, 0, 0, 0, 0, 20, 15, 12,
  1, 0, 0, 1, 0, 0, 1, 0, 0,
  0, 1, 0, 0, 1, 0, 0, 1, 0,
  0, 0, 1, 0, 0, 1, 0, 0, 1
), nrow = 9, byrow = TRUE)

# Define the direction of inequalities (less than or equal to)
inequality_direction <- c(
```

```
  "<=",
  "<=",
  "<=",
  "<=",
  "<=",
  "<=",
  "<=",
  "<=",
  "<="
)

# Define the right-hand side (RHS) values of the constraints
rhs_values <- c(
  750,
  900,
  450,
  13000,
  12000,
  5000,
  900,
  1200,
  750
)

# Solve the LP problem to maximize profit
lp("max", profit_contributions, constraints_matrix, inequality_direction, rhs_values)
```

```
## Success: the objective function is 708000
```

```
# Retrieve the value of the objective function (maximum profit) and the values of the decision variable
lp("max", profit_contributions, constraints_matrix, inequality_direction, rhs_values)$solution
```

```
## [1] 350.0000 400.0000   0.0000   0.0000 400.0000 500.0000   0.0000 133.3333
## [9] 250.0000
```