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title: "Quant. MGMT Modeling Assignment 1"
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output: html_document
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```{r}
# Problem 1:
# A.    The decision variables are the Collegiate and Mini backpacks. Precisely how many of each
can be produced in a week

# B.    The Objective Function for this problem would be;
# P(profit) = 32C($32per collegiate) + 24M($24 per mini)

# C.    The constraints would be:
# 3C + 2M <= 5000
# 45C + 40M <= 84000
# 0<= C <= 1000
# 0<= M <= 1200

# D.
# 3(911) + 2(1075) = 4883 sq ft
# 45(911) + 40(1075) = 83995 mins
# 32(911) + 24(1075) = $54,952



```

```{r}
# Probelm 2:

# A: Finding the Decision Variables:
# L[1] = Number of large units produced per day at Plant 1
# M[1] = Number of medium units produced per day at Plant 1
# S[1] = Number of small units produced per day at Plant 1
# L[2] = Number of large units produced per day at Plant 2
#       M[2] = Number of medium units produced per day at Plant 2
# S[2] = Number of small units produced per day at Plant 2
# L[3] = Number of large units produced per day at Plant 3
# M[3] = Number of medium units produced per day at Plant 3
# S[3] = Number of small units produced per day at Plant 3

# B: Formulate a linear programming model for this problem.

obj2 <- c(420, 360, 300, 420, 360, 300, 420, 360, 300, 0)  # t has 0 coefficient

constr2 <- matrix(0, nrow=10, ncol=10)

constr2[1, 1:3] <- 1; constr2[1, 10] <- -750
constr2[2, 4:6] <- 1; constr2[2, 10] <- -900
constr2[3, 7:9] <- 1; constr2[3, 10] <- -450

constr2[4, 1:3] <- c(20, 15, 12); rhs4 <- 13000
constr2[5, 4:6] <- c(20, 15, 12); rhs5 <- 12000
constr2[6, 7:9] <- c(20, 15, 12); rhs6 <- 5000

constr2[7, c(1,4,7)] <- 1; rhs7 <- 900    # Large
constr2[8, c(2,5,8)] <- 1; rhs8 <- 1200   # Medium
constr2[9, c(3,6,9)] <- 1; rhs9 <- 750    # Small

constr2[10, 10] <- 1; rhs10 <- 1
````
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```
rhs2 <- c(0,0,0,rhs4,rhs5,rhs6,rhs7,rhs8,rhs9,rhs10)
dir2 <- c("=", "=", "=", "<=", "<=", "<=", "<=", "<=", "<=", "<=")

sol2 <- lp("max", obj2, constr2, dir2, rhs2, all.int=FALSE)

cat("\n=== Problem 2: Weigelt Corporation ===\n")
cat("Status:", sol2$status, "\n")
cat("Optimal Profit = $", sol2$objval, "\n")
cat("Optimal Utilization (t) =", round(sol2$solution[10],4), "\n")
cat("Production plan:\n")
cat("L1, M1, S1 =", sol2$solution[1:3], "\n")
cat("L2, M2, S2 =", sol2$solution[4:6], "\n")
cat("L3, M3, S3 =", sol2$solution[7:9], "\n")


```