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# Solve LP Model
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library(lpSolve)

objective_coefficients <- c(420,420,420,360,360,360,300,300,300,0)

constraints <- matrix(0, nrow=9, ncol=10)

constraints[1, c(1,4,7,10)] <- c(1,1,1,-750)
constraints[2, c(2,5,8,10)] <- c(1,1,1,-900)
constraints[3, c(3,6,9,10)] <- c(1,1,1,-450)

constraints[4, c(1,4,7)] <- c(20,15,12)
constraints[5, c(2,5,8)] <- c(20,15,12)
constraints[6, c(3,6,9)] <- c(20,15,12)

constraints[7, c(1,2,3)] <- 1
constraints[8, c(4,5,6)] <- 1
constraints[9, c(7,8,9)] <- 1

constraints_directions <- c("==","==","==", "<=","<=","<=","<=","<=","<=")

constraints_rhs <- c(0,0,0, 13000,12000,5000, 900,1200,750)

solution <- lp(
  "max",
  objective_coefficients,
  constraints,
  constraints_directions,
  constraints_rhs
)

if(solution$status==0){
  cat("Optimal solution found!\n\n")

  plants_production <- matrix(solution$solution[1:9], nrow=3, byrow=TRUE)
  colnames(plants_production) <- c("Large","Medium","Small")
  rownames(plants_production) <- c("Plant1","Plant2","Plant3")

  print("Units produced per plant:")
  print(plants_production)

  u <- solution$solution[10]
  cat("\nShared percentage of capacity used (u):", round(u*100,2), "%\n")

  cat("\nMaximum Profit:", solution$objval,"\n")
} else {

```

```
cat("No feasible solution found.\n")
}
```

```
## Optimal solution found!
##
## [1] "Units produced per plant:"
##      Large   Medium   Small
## Plant1 516.6667   0.0000   0.0000
## Plant2 177.7778 666.6667   0.0000
## Plant3   0.0000 166.6667 416.6667
##
## Shared percentage of capacity used (u): 92.59 %
##
## Maximum Profit: 696000
```