LPModel

```
# install.packages("lpSolveAPI")
tinytex::install_tinytex()
```

```
library(lpSolveAPI)
```

```
lprec <- make.lp(0,9)
```

```
set.objfn(lprec, c(420, 360,300,420,360,300,420,360,300))
```

```
lp.control(lprec, sense='max')
```

```
## $anti.degen
## [1] "fixedvars" "stalling"
##
## $basis.crash
## [1] "none"
##
## $bb.depthlimit
## [1] -50
##
## $bb.floorfirst
## [1] "automatic"
##
## $bb.rule
## [1] "pseudononint" "greedy"       "dynamic"      "rcostfixing"
##
## $break.at.first
## [1] FALSE
##
## $break.at.value
## [1] 1e+30
##
## $epsilon
##       epsb       epsd      epsel      epsint epsperturb   epspivot
##      1e-10      1e-09      1e-12       1e-07      1e-05      2e-07
##
## $improve
## [1] "dualfeas" "thetagap"
##
## $infinite
## [1] 1e+30
##
## $maxpivot
## [1] 250
```

```
##
## $mip.gap
## absolute relative
##    1e-11    1e-11
##
## $negrange
## [1] -1e+06
##
## $obj.in.basis
## [1] TRUE
##
## $pivoting
## [1] "devex"    "adaptive"
##
## $presolve
## [1] "none"
##
## $scalelimit
## [1] 5
##
## $scaling
## [1] "geometric"   "equilibrate" "integers"
##
## $sense
## [1] "maximize"
##
## $simplextype
## [1] "dual"   "primal"
##
## $timeout
## [1] 0
##
## $verbose
## [1] "neutral"
```

```
add.constraint(lprec, c(1,1,1,0,0,0,0,0,0), "<=", 750)
add.constraint(lprec, c(0,0,0,1,1,1,0,0,0), "<=", 900)
add.constraint(lprec, c(0,0,0,0,0,0,1,1,1), "<=", 450)
```

```
add.constraint(lprec, c(20,15,12,0,0,0,0,0,0), "<=", 13000)
add.constraint(lprec, c(0,0,0,20,15,12,0,0,0), "<=", 12000)
add.constraint(lprec, c(0,0,0,0,0,0,20,15,12), "<=", 5000)
```

```
add.constraint(lprec, c(1,1,1,0,0,0,0,0,0), "<=", 900)
add.constraint(lprec, c(0,0,0,1,1,1,0,0,0), "<=", 1200)
add.constraint(lprec, c(0,0,0,0,0,0,1,1,1), "<=", 750)
```

```
add.constraint(lprec, c(1/750,1/750,1/750,-1/900,-1/900,-1/900,0,0,0), "=", 0)
add.constraint(lprec, c(1/750,1/750,1/750,0,0,0,-1/450,-1/450,-1/450), "=", 0)
```

```
set.bounds(lprec, lower = c(0,0,0,0,0,0,0,0,0), columns = c(1,2,3,4,5,6,7,8,9))
```

```
Rownames <- c("Capacity Plant1", "Capacity Plant2", "Capacity Plant3", "Square Foot Plant 1", "Square Fo

ColNames <- c("Product 1 Plant 1", "Product 2 Plant 1", "Product 3 Plant 1", "Product 1 Plant 2", "Produ
```

```
dimnames(lprec) <- list(Rownames, ColNames)
```

```
lprec
```

```
## Model name:
##   a linear program with 9 decision variables and 11 constraints
```

```
solve(lprec)
```

```
## [1] 0
```

```
get.objective(lprec)
```

```
## [1] 696000
```

```
get.variables(lprec)
```

```
## [1] 516.6667 177.7778   0.0000   0.0000 666.6667 166.6667   0.0000   0.0000
## [9] 416.6667
```

#We can see here the various levels of production for each of the 3 products at each of the 3 factories. From Left to Right we have products 1-3 nested with Factories 1 - 3.