assignment_9

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1/2. Maximize: Z = P(Total Profit) - 6(Change in employement level) - 3(Decrease in next year's earning) Maximize: Z = P - 6y1+ - 6y1- -3y2-

x1 = Product1 x2 = Product2 x3 = Product3 y1+ = increase in employment y1- = decrease in employment y2- = decrease in next year's earnings

(y1+ - y1-) = 6x1 + 4x2 + 5x3 - 50 (y2+ - y2-) = 8x1 + 7x2 + 5x3 - 75 y2+ = 0 #no harm in exceeding 75 P = 20x1 + 15x2 + 25x3

Maximize: Z = P - 6y1+ - 6y1- -3y2-

6x1 + 4x2 + 5x3 - (y1+ - y1-) = 50 8x1 + 7x2 + 5x3 - (y2+ - y2-) = 75 P = 20x1 + 15x2 + 25x3 xj >= 0, yi+ >=0, yi- >= 0, y2- < Z

#3 #I tried to use an LP file, however I could not get my computer to read. I will append to assignment anyways.

```
# 6 decision variables, 0 constraints
library(lpSolveAPI)
decision = make.lp(0,6)
```

```
set.objfn(decision, c(20,15,25,-6,-6,-3))
lp.control(decision, 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(decision, c(6,4,5,1,-1,0), "=", 50) #constraint y1
add.constraint(decision, c(8,7,5,0,0,1), ">=", 75) #constraint y2
```

```
Rownames = c('PX1','PX2','PX3','Y1M','Y1P','Y2M')
Colnames = c('y1','y2')
```

```
decision
```

```
## Model name:
##             C1    C2    C3    C4    C5    C6
## Maximize    20    15    25    -6    -6    -3
## R1           6     4     5     1    -1     0   =  50
## R2           8     7     5     0     0     1  >=  75
## Kind       Std   Std   Std   Std   Std   Std
## Type      Real  Real  Real  Real  Real  Real
## Upper      Inf   Inf   Inf   Inf   Inf   Inf
## Lower        0     0     0     0     0     0
```

```
solve(decision)
```

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

```
get.objective(decision)
```

```
## [1] 225
```

```
get.variables(decision)
```

```
## [1]  0  0 15  0 25  0
```

```
get.constraints(decision)
```

```
## [1] 50 75
```

Maximum = 225 = 0x1 + 0x2 + 15x3 - 0y1m - 25y1p + 0 y2m 225 = 15(25) - 25(6)

Profit = 225 million dollars Product 3 = 15 units Labor = Change (grow) Earnings = no decrease