Assignment 9 Quant MGMT

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1. $20x_1 + 15x_2 + 25x_3 = \max$ $6x_1 + 4x_2 + 5x_3 = 50$ $8x_1 + 7x_2 + 5x_3 \geq 75$

$y_1 = 20x_1 + 15x_2 + 25x_3$ $y_2 = 6x_1 + 4x_2 + 5x_3 - 50$ $y_3 = 8x_1 + 7x_2 + 5x_3 - 75$

$20x_1 + 15x_2 + 25x_3 - (y^+_1 - y^-_1) = \max$ $6x_1 + 4x_2 + 5x_3 - (y^+_2 - y^-_2) = 50$ $8x_1 + 7x_2 + 5x_3 - (y^+_3 - y^-_3) = 75$

$P = 20x_1 + 15x_2 + 25x_3$

2. Objective Function:

$Z = y^+_1 + 6y^-_2 + 3y^-_3$

3. Objective Function:

$Z = y^+_1 + 6y^-_2 + 3y^-_3$

Subject to:

$20x_1 + 15x_2 + 25x_3 - (y^+_1 - y^-_1) = \infty$ $6x_1 + 4x_2 + 5x_3 - (y^+_2 - y^-_2) = 50$ $8x_1 + 7x_2 + 5x_3 - (y^+_3 - y^-_3) = 75$

Non-negativity of the decision variables:

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$ $y^+_1 \geq 0, y^-_1 \geq 0, y^+_2 \geq 0, y^-_2 \geq 0, y^+_3 \geq 0, y^-_3 \geq 0$

```
library(lpSolveAPI)

lprec <- make.lp(3, 9)


set.objfn(lprec, c(0, 0, 0, 1, 1, 1, 1, 1, 1))

invisible(lp.control(lprec, sense = 'min'))

set.row(lprec, 1, c(20, 15, 25, -1, 1, 0, 0, 0, 0), indices = c(1,2,3,4,5,6,7,8,9))

set.row(lprec, 2, c(6, 4, 5, 0, 0, 1, -1, 0, 0), indices = c(1,2,3,4,5,6,7,8,9))

set.row(lprec, 3, c(8, 7, 5, 0, 0, 0, 0, -1, 1), indices = c(1,2,3,4,5,6,7,8,9))

rhs <- c("maximize",50,75)

set.rhs(lprec, rhs)
```

```
## Warning in set.constr.value(lprec, rhs = b, constraints = constraints): NAs
## introduced by coercion
```

```
set.constr.type(lprec, c("=", "=", "="))

set.bounds(lprec, lower = rep(0, 9))

solve(lprec)
```

```
## [1] 5
```

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

```
## [1] 8.944272e+29
```

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

```
## [1] 0.000000e+00 0.000000e+00 1.000000e+30 0.000000e+00 0.000000e+00
## [6] 0.000000e+00 4.472136e+29 4.472136e+29 0.000000e+00
```

In the conclusion, I have found that all the deviations are close to and essentially Zero.