Final Exam

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### we depend on 3 variables GPA, Work Experience, and GRE Score

### There is a score for each student

### Scare can be calculated by multiplying the 3 values of variables

### then we form the lp file with those scorers

The objective function is to maximize the scores of the students ,while each student can be chosen only once.

The mathematical model

min X X c y þ X wP.zU — zLΣ þ wNðvU — vLÞ

s:t: X xij ¼ 1 8j

yjk—xij—xik ≤ —1 8j; k; i (2)

vi— xij ¼ 0 8i (3)

zli— X aljxij ¼ 0 8i; l (4)

vL ≤ vi ≤ vU 8i (5)

zL ≤ zli ≤ zU 8i; l (6)

xij 2 f0; 1g 8i; j (7)

yjk 2 f0; 1g 8j; k (8)

zli ≤ 0 8i; l (9)

vi ≤ 0 8i (10)

zL; zU ≤ 0 8l (11)

vL; vU ≤ 0 (12)

## Read the lp file>>>

library(lpSolveAPI)  
x <- read.lp("Final.lp")  
x

## Model name:   
## a linear program with 48 decision variables and 16 constraints

solve(x)

## [1] 0

get.objective(x)

## [1] 1411.7

get.variables(x)

## [1] 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 0 0 0 0 1 0 0 0 1  
## [39] 0 0 1 0 0 1 0 0 0 0

get.constraints(x)

## [1] 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3

get.sensitivity.objex(x)

## $objfrom  
## [1] -1.000e+30 4.440e+01 5.600e+01 1.980e+02 3.800e+01 8.880e+01  
## [7] 1.224e+02 1.950e+01 -1.000e+30 7.560e+01 1.674e+02 -1.000e+30  
## [13] 2.520e+02 4.440e+01 5.600e+01 1.980e+02 3.800e+01 8.880e+01  
## [19] -1.000e+30 1.950e+01 -1.000e+30 7.560e+01 -1.000e+30 -1.000e+30  
## [25] 2.520e+02 4.440e+01 -1.000e+30 -1.000e+30 3.800e+01 8.880e+01  
## [31] 1.224e+02 1.950e+01 -1.000e+30 7.560e+01 1.674e+02 -1.000e+30  
## [37] 2.520e+02 4.440e+01 5.600e+01 1.980e+02 -1.000e+30 8.880e+01  
## [43] 1.224e+02 -1.000e+30 -1.000e+30 7.560e+01 1.674e+02 -1.000e+30  
##   
## $objtill  
## [1] 2.520e+02 1.000e+30 1.000e+30 1.000e+30 1.000e+30 8.880e+01 1.000e+30  
## [8] 1.000e+30 2.016e+02 1.000e+30 1.000e+30 1.480e+02 1.000e+30 1.000e+30  
## [15] 1.000e+30 1.000e+30 1.000e+30 1.000e+30 1.224e+02 1.000e+30 2.016e+02  
## [22] 1.000e+30 1.674e+02 1.480e+02 1.000e+30 1.000e+30 5.600e+01 1.980e+02  
## [29] 1.000e+30 1.000e+30 1.000e+30 1.000e+30 2.016e+02 7.560e+01 1.000e+30  
## [36] 1.480e+02 1.000e+30 4.440e+01 1.000e+30 1.000e+30 3.800e+01 1.000e+30  
## [43] 1.000e+30 1.950e+01 2.016e+02 1.000e+30 1.000e+30 1.480e+02  
##   
## $objfromvalue  
## [1] -1e+30 0e+00 0e+00 0e+00 0e+00 -1e+30 0e+00 0e+00 -1e+30 -1e+30  
## [11] 0e+00 0e+00 0e+00 0e+00 0e+00 0e+00 0e+00 -1e+30 -1e+30 0e+00  
## [21] 0e+00 0e+00 -1e+30 -1e+30 0e+00 -1e+30 -1e+30 -1e+30 0e+00 0e+00  
## [31] 0e+00 0e+00 0e+00 -1e+30 0e+00 0e+00 0e+00 -1e+30 0e+00 0e+00  
## [41] -1e+30 0e+00 0e+00 -1e+30 0e+00 0e+00 0e+00 0e+00  
##   
## $objtillvalue  
## [1] NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA  
## [26] NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA

The groups are:

Group 1. X11, x61, x91 Students number (1,6,9)

Group 2. X72, x112, x122 Students number (7,11,12)

Group 3. X33, x43, x103 Students number (3,4,10)

Group 4. X24, x54, x84 Students number (2,5,8)

\*\*\* we can notice that each student is presented only one time in the 4 groups.