```
   Person GPA Gender HoursWorkedProj CurrentCourseGrade
1       1 3.5      0               5                80
2       2 2.5      1              12                70
3       3 3.0      1               4                65
4       4 4.0      1              10                40
5       5 3.3      0               9                30
6       6 3.1      0              13                50
7       7 3.8      1               8                55
8       8 2.7      1              11                25
9       9 3.2      0               3                75
10     10 3.0      0               9                60
11     11 3.3      0              15                45
12     12 2.9      1               4                75
```

```
library(lpSolveAPI)
lppoint <- make.lp(0, 48)
set.type(lppoint, 48, "integer")
set.objfn(lppoint, rep(c(80,70,65,40,30,50,55,25,75,60,45,75),4))
lp.control(lppoint,sense='max')
```

```
add.constraint(lppoint, c(rep(1,12),rep(0,36)), "=", 3)
add.constraint(lppoint, c(rep(0,12),rep(1,12),rep(0,24)), "=", 3)
add.constraint(lppoint, c(rep(0,24),rep(1,12),rep(0,12)), "=", 3)
add.constraint(lppoint, c(rep(0,36),rep(1,12)), "=", 3)
add.constraint(lppoint, rep(GroupProj$GPA,4), ">=", 11)
add.constraint(lppoint, rep(GroupProj$GPA,4), ">=", 10)
add.constraint(lppoint, rep(GroupProj$GPA,4), ">=", 9)
add.constraint(lppoint, rep(GroupProj$GPA,4), ">=", 8)
add.constraint(lppoint, rep(GroupProj$Gender,4), ">=", 1)
add.constraint(lppoint, rep(GroupProj$Gender,4), ">=", 1)
add.constraint(lppoint, rep(GroupProj$Gender,4), ">=", 1)
add.constraint(lppoint, rep(GroupProj$Gender,4), ">=", 1)
add.constraint(lppoint, rep(GroupProj$HoursWorkedProj,4), ">=", 40)
add.constraint(lppoint, rep(GroupProj$HoursWorkedProj,4), ">=", 35)
add.constraint(lppoint, rep(GroupProj$HoursWorkedProj,4), ">=", 30)
add.constraint(lppoint, rep(GroupProj$HoursWorkedProj,4), ">=", 25)
add.constraint(lppoint, rep(c(1,rep(0,11)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,1),1,rep(0,10)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,2),1,rep(0,9)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,3),1,rep(0,8)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,4),1,rep(0,7)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,5),1,rep(0,6)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,6),1,rep(0,5)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,7),1,rep(0,4)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,8),1,rep(0,3)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,9),1,rep(0,2)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,10),1,rep(0,1)),4), "=", 1)
add.constraint(lppoint, rep(c(rep(0,11),1),4), "=", 1)
solve(lppoint)
```

```
[1] 0
```

**With the solver giving us 0, we know it is finding a solution**

```
get.objective(lppoint)
```

```
[1] 670
```

**The Maximum chance of success is 670 for all groups on the class project, which is the overall course grade for the class**

```
get.constraints(lppoint)
```

```
 [1]   3.0   3.0   3.0   3.0  38.3  38.3  38.3  38.3   6.0   6.0   6.0   6.0
[13] 103.0 103.0 103.0 103.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0   1.0
[25]   1.0   1.0   1.0   1.0
```

**Confirms all constraints are met.**

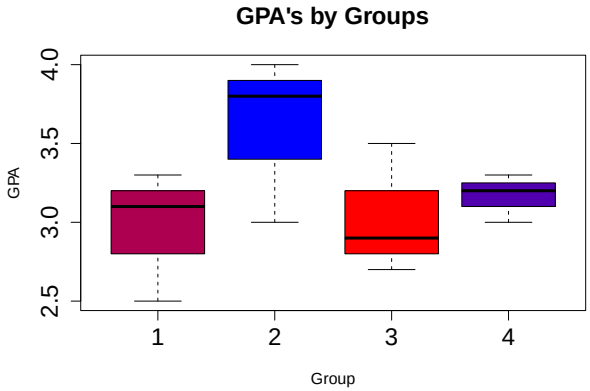
```
get.variables(lppoint)
```

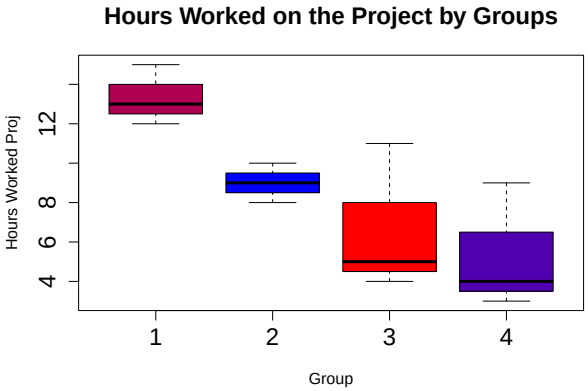
```
 [1] 0 1 0 0 0 1 0 0 0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0
[39] 1 0 1 0 0 0 1 0 0 0
```

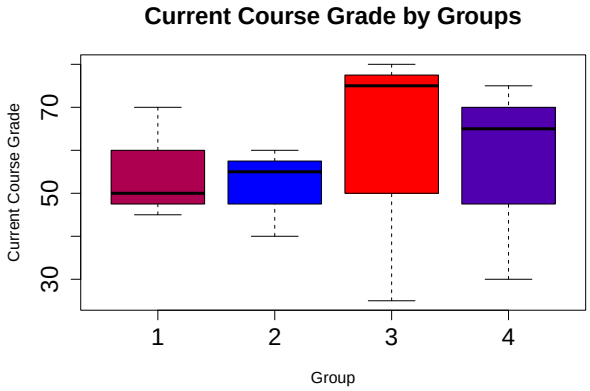
**1 determines the group they are assigned to. This is the optimal mix of group members. Of the first 12 entries, only 3 "1"s are needed and the rest are 0.**

```
   Person GPA Gender HoursWorkedProj CurrentCourseGrade Group
1       1 3.5      0               5                 80     3
2       2 2.5      1              12                 70     1
3       3 3.0      1               4                 65     4
4       4 4.0      1              10                 40     2
5       5 3.3      0               9                 30     4
6       6 3.1      0              13                 50     1
7       7 3.8      1               8                 55     2
8       8 2.7      1              11                 25     3
9       9 3.2      0               3                 75     4
10     10 3.0      0               9                 60     2
11     11 3.3      0              15                 45     1
12     12 2.9      1               4                 75     3
```

The last column says which group each memeber is assigned to.




The box plots show us

Group 1 spent the most time on the project.

Group 2 has the highest GPA. They also have the highest amount of hours worked individually.

Group 3 has the highest variablity of the grades. They also have the outliers of the dataset.

Group 4 spent the least amount of time on the project.

Due to group 2 having the highest GPA, they have the best students in the class.