HW 4 - Stats 101B

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Q1)

part a)

Response, factors, blocks, held constant factors.

Response: scores of students on reading comprehension

Factors: reading modality(screen or paper)

Blocks: Word reading and vocabulary, two different primary schools in Norway

Held constant factors: grade(tenth), texts, type of text

I would also perform multiple tests in different age groups and also separate by gender, because result might vary due to age group and gender could be a good blocking factor to make sure the student population being tested is uniform

part b)

There were 72 students in the study, I don't believe that this is large enough of a sample size, the power was 0.67, meaning that there is a high probability of not being able to properly identify to reject the null. I would increases samples to get power to at least 0.80

part c)

The author is talking about the consistency of the questionnaire, saying that because of Cronbach's alpha is high at 0.75, then the questions used were consistently answered among all the participants

part d)

```
data1 <- read.csv("paper_vs_ereader.csv")
head(data1)
```

```
##   Studentnumber Sex School Condition Vocabulary Wordchain SumExpositoryTxt
## 1       2602142 boy      1     paper         18        53               16
## 2       2602145 boy      1     paper         18        53               17
## 3       2602158 boy      1     paper         23        53               17
## 4       2602177 boy      1     paper         10        50               13
## 5       2602261 boy      2     paper         22        52               18
```

```
## 6       2602282 boy      2     paper         16        51               17
##   SumNarrativeTxt TotalSum_Readingcompr ControlsumNarrativeTxt
## 1              15                    31                      9
## 2              11                    28                      9
## 3              15                    32                     10
## 4              10                    23                      7
## 5              13                    31                      6
## 6               7                    24                      6
##   ControlsumExpositoryTxt Controlsum Gaven2Mc Gaven3Mc Gaven4Mc Gaven5Cr
## 1                      15         24        4        1        2        1
## 2                      16         25        4        1        2        1
## 3                      15         25        4        1        2        1
## 4                       2          9        4        1        2        1
## 5                      13         19        4        1        3        1
## 6                      16         22        4        1        2        9
##   Gaven6Cr Gaven7Cr Gaven8Cr Gaven9Cr Gaven10Mc Gaven11Cr Gaven12Cr SH1Mc SH3Mc
## 1        0        2        0        1         1         1         1     3     2
## 2        0        2        0        1         3         1         0     3     2
## 3        9        2        1        0         3         0         2     3     2
## 4        9        1        0        1         2         1         0     1     4
## 5        9        2        0        0         3         9         9     3     2
## 6        9        9        9        1         3         1         9     3     4
##   SH4Mc SH5Mc SH6Mc SH10Mc SH11Mc SH12Mc SH13Mc SH15Mc SH16Mc SH17Mc SH18Mc
## 1     1     2     2      4      1      2      3      3      2      3      4
## 2     1     2     2      2      4      2      2      3      2      3      1
## 3     1     2     2      2      4      2      2      3      2      3      4
## 4     1     1     2      9      9      9      9      9      9      9      9
## 5     1     2     2      1      4      2      2      3      2      3      2
## 6     1     2     2      3      4      2      2      3      2      4      1
##   SH19Mc SH20Mc SH21Mc SH22Mc SH24Cr SH25Mc SH26Mc SH27Mc Antarktis1 Antarktis2
## 1      4      3      3      3      9      9      9      9          4          4
## 2      4      3      3      2      2      2      3      2          4          4
## 3      4      3      8      9      2      3      3      2          4          4
## 4      9      9      9      9      9      9      9      9          4          4
## 5      4      3      1      1      9      1      2      1          4          4
## 6      4      3      3      3      2      3      3      2          4          4
##   Antarktis3 Antarktis4 Antarktis5 Antarktis6 Antarktis7 Antarktis8 Antarktis9
## 1          2          4          3          3          3          1          4
## 2          2          4          3          1          3          1          4
## 3          2          4          3          1          3          1          4
## 4          3          4          3          3          3          4          4
## 5          1          4          3          1          3          1          4
## 6          1          4          3          1          3          1          4
##   Antarktis10 Antarktis11 Antarktis12 Antarktis13 Antarktis14 Antarktis15
## 1           4           1           2           3           1           2
## 2           2           1           2           3           1           2
## 3           4           1           2           3           2           2
## 4           3           1           2           3           4           2
## 5           4           1           2           3           1           2
## 6           3           1           2           3           1           2
##   Antarktis16 Antarktis17 Antarktis18 Antarktis19 Coriander1 Coriander2
## 1           1           4           1           4          3          2
## 2           3           4           1           4          3          2
## 3           3           4           1           4          3          2
```

```
## 4           4           4           1           4          3          2
## 5           3           4           1           4          3          2
## 6           3           4           1           4          3          2
##   Coriander3 Coriander4 Coriander5 Coriander6 Coriander7 Coriander8 Coriander9
## 1          2          2          3          8          1          2          3
## 2          2          2          3          8          1          4          1
## 3          2          2          3          8          1          2          3
## 4          2          2          4          8          2          2          1
## 5          4          2          3          8          1          2          3
## 6          2          1          1          8          2          1          3
##   Coriander10 Coriander11 Coriander12 Coriander13 Coriander14 Coriander15
## 1           2           1           4           1           3           4
## 2           2           4           4           2           3           4
## 3           2           1           4           1           3           4
## 4           2           1           4           1           3           2
## 5           2           1           4           1           2           4
## 6           2           2           1           3           3           2
##   Spørsmål1 Spørsmål2 Spørsmål3 Spørsmål4 Spørsmål5 Spørsmål6 Spørsmål7
## 1         1         1         0         1         1         0         9
## 2         1         1         0         1         1         0         0
## 3        NA        NA        NA        NA        NA        NA        NA
## 4         1         1         1         1         1         0         0
## 5        NA        NA        NA        NA        NA        NA        NA
## 6         1         1         0         1         0         0         9
##   pgaven2Mc pgaven3Mc pgaven4Mc pgaven5Cr pgaven6cr pgaven7Cr pgaven8Cr
## 1         1         1         1         1         0         2         0
## 2         1         1         1         1         0         2         0
## 3         1         1         1         1         0         2         1
## 4         1         1         1         1         0         1         0
## 5         1         1         0         1         0         2         0
## 6         1         1         1         0         0         0         0
##   pgaven9Cr pgaven10Mc pgaven11cr pgaven12Cr X.1Score X.2Score X.3Score
## 1         1          0          1          1        1        1        0
## 2         1          1          1          0        1        1        0
## 3         0          1          0          2        1        1        0
## 4         1          0          1          0        1        1        0
## 5         0          1          0          0        1        1        0
## 6         1          1          1          0        1        1        0
##   X.4Score X.5Score X.6Score X.7Score X.8Score X.9Score X.10Score X.11Score
## 1        1        1        0        1        1        1         1         1
## 2        1        1        1        1        1        1         0         1
## 3        1        1        1        1        1        1         1         1
## 4        1        1        0        1        0        1         0         1
## 5        1        1        1        1        1        1         1         1
## 6        1        1        1        1        1        1         0         1
##   X.12Score X.13Score X.14Score X.15Score X.16Score X.17Score X.18Score
## 1         1         1         1         1         0         1         1
## 2         1         1         1         1         1         1         1
## 3         1         1         0         1         1         1         1
## 4         1         1         0         1         0         1         1
## 5         1         1         1         1         1         1         1
## 6         1         1         1         1         1         1         1
##   X.19Score X.20Score X.21Score X.22Score X.23Score X.24Score X.25Score
## 1         1         1         1         1         1         1         1
```

```
## 2         1         1         1         1         1         1         1
## 3         1         1         1         1         1         1         1
## 4         1         1         1         1         1         0         0
## 5         1         1         1         0         1         1         1
## 6         1         1         1         1         0         0         1
##   X.26Score X.27Score X.28Score X.29Score X.30Score X.31Score X.32Score
## 1         1         1         1         1         1         1         1
## 2         1         0         0         1         0         1         0
## 3         1         1         1         1         1         1         1
## 4         0         1         0         1         1         1         1
## 5         1         1         1         1         1         1         1
## 6         0         0         1         1         0         0         0
##   X.33Score X.34Score pSH1 pSH3Mc pSH4Mc pSH5Mc pSH6Mc pSH10Mc pSH11Mc pSH12Mc
## 1         1         1    1      1      1      1      1       1       1       1
## 2         1         1    1      1      1      1      1       0       0       1
## 3         1         1    1      1      1      1      1       0       0       1
## 4         1         0    0      0      1      0      1       0       0       0
## 5         0         1    1      1      1      1      1       0       0       1
## 6         1         0    1      0      1      1      1       0       0       1
##   pSH13Mc pSH15Mc pSH16Mc pSH17Mc pSH18Mc pSH19Mc pSH20Mc pSH21Mc pSH22Mc
## 1       0       1       1       1       0       1       1       1       1
## 2       1       1       1       1       1       1       1       1       0
## 3       1       1       1       1       0       1       1       0       0
## 4       0       0       0       0       0       0       0       0       0
## 5       1       1       1       1       0       1       1       0       0
## 6       1       1       1       0       1       1       1       1       1
##   pSH24Cr pSH25Mc pSH26Mc pSH27Mc Paper_Paper Paper_Computer Computer_Computer
## 1       0       0       0       0           0              1                 0
## 2       1       0       0       1           0              1                 0
## 3       1       1       0       1           0              1                 0
## 4       0       0       0       0           0              1                 0
## 5       0       0       1       0           0              1                 0
## 6       1       1       0       1           0              1                 0
```

part e)

Question 2

part a)

```
baldness <- read.table("HeartDiseaseBaldness.txt", header=TRUE)
head(baldness)
```

```
##   Heart_Disease Baldness
## 1            no     none
## 2            no     none
## 3            no     none
## 4            no     none
## 5            no     none
## 6           yes     none
```

part b)

```
dim(baldness)
```

```
## [1] 1435    2
```

part c)

```
colnames(baldness)
```

```
## [1] "Heart_Disease" "Baldness"
```

part d)

H0: Early Baldness is uncorrelated with Heart Disease

HA: Early Baldness is correlated with Heart Disease

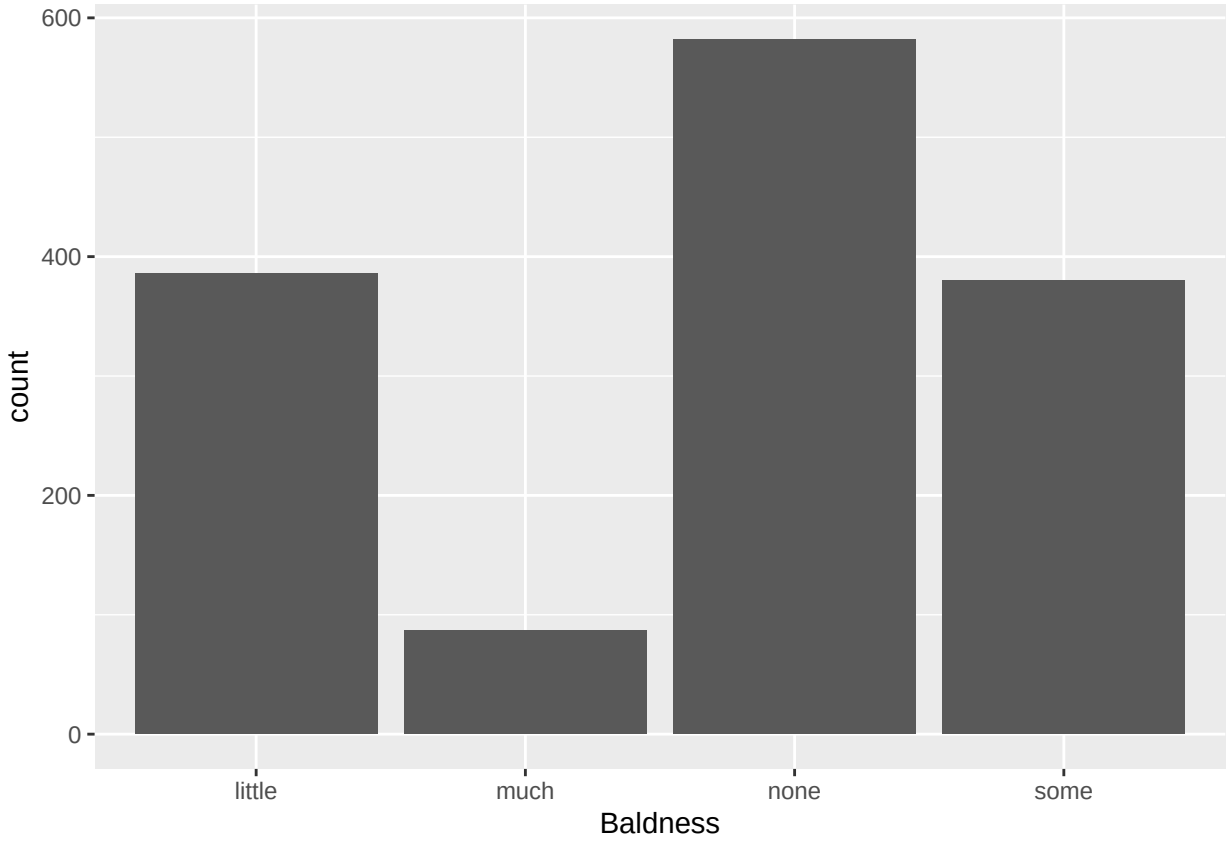
part e)

```
table(baldness$Heart_Disease, baldness$Baldness)
```

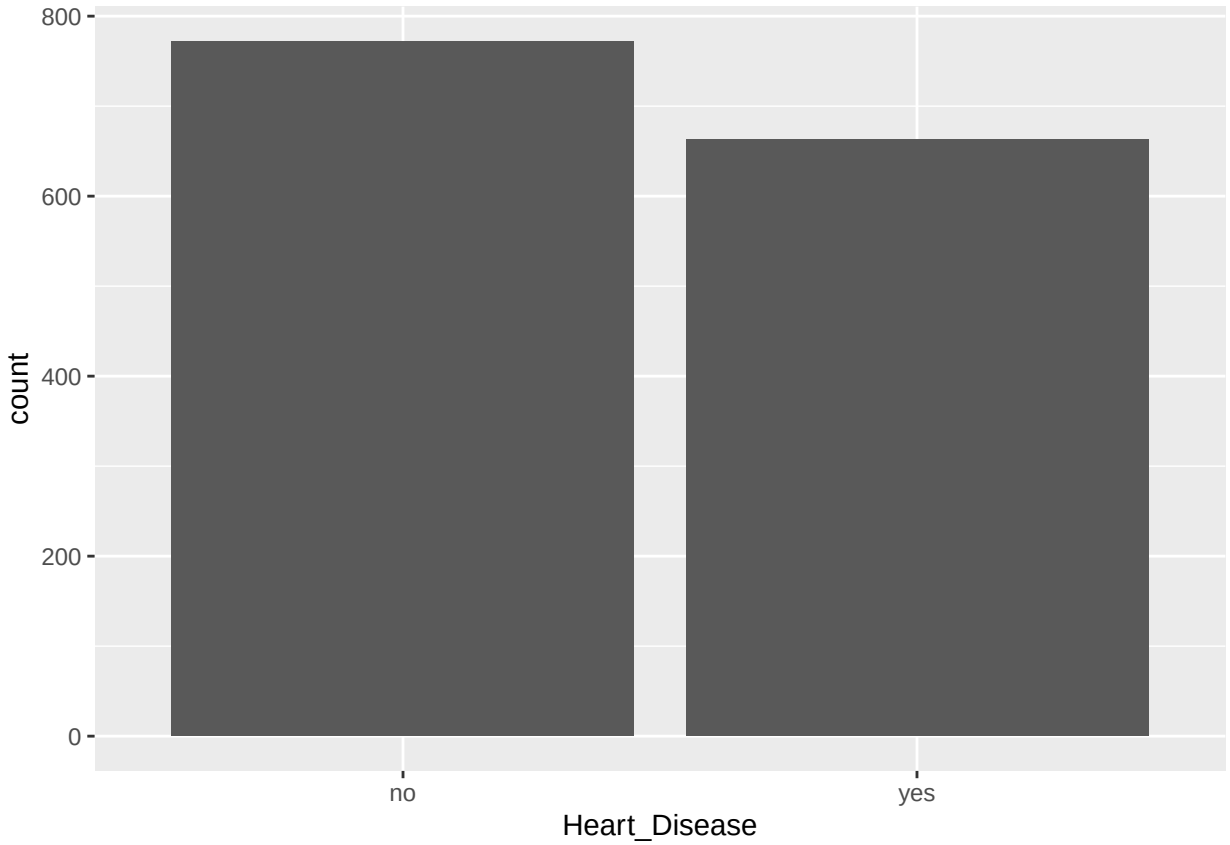
```
##
##       little much none some
##   no     221   35  331  185
##   yes    165   52  251  195
```

part f)

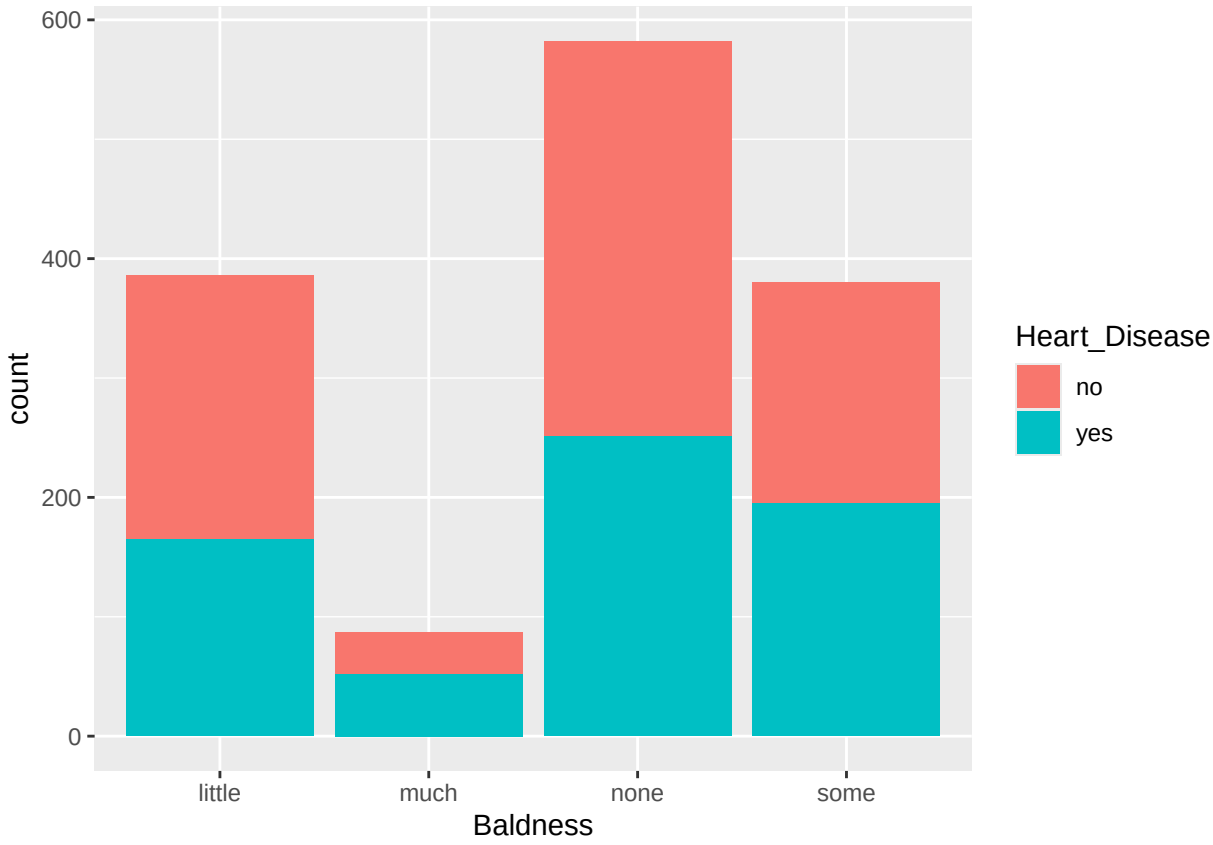
```
library(ggplot2)
ggplot(baldness, aes(x = Baldness)) + geom_bar()
```




```
ggplot(baldness, aes(x = Heart_Disease)) + geom_bar()
```




```
ggplot(baldness, aes(x = Baldness, fill = Heart_Disease)) + geom_bar()
```



part g)

Q3)

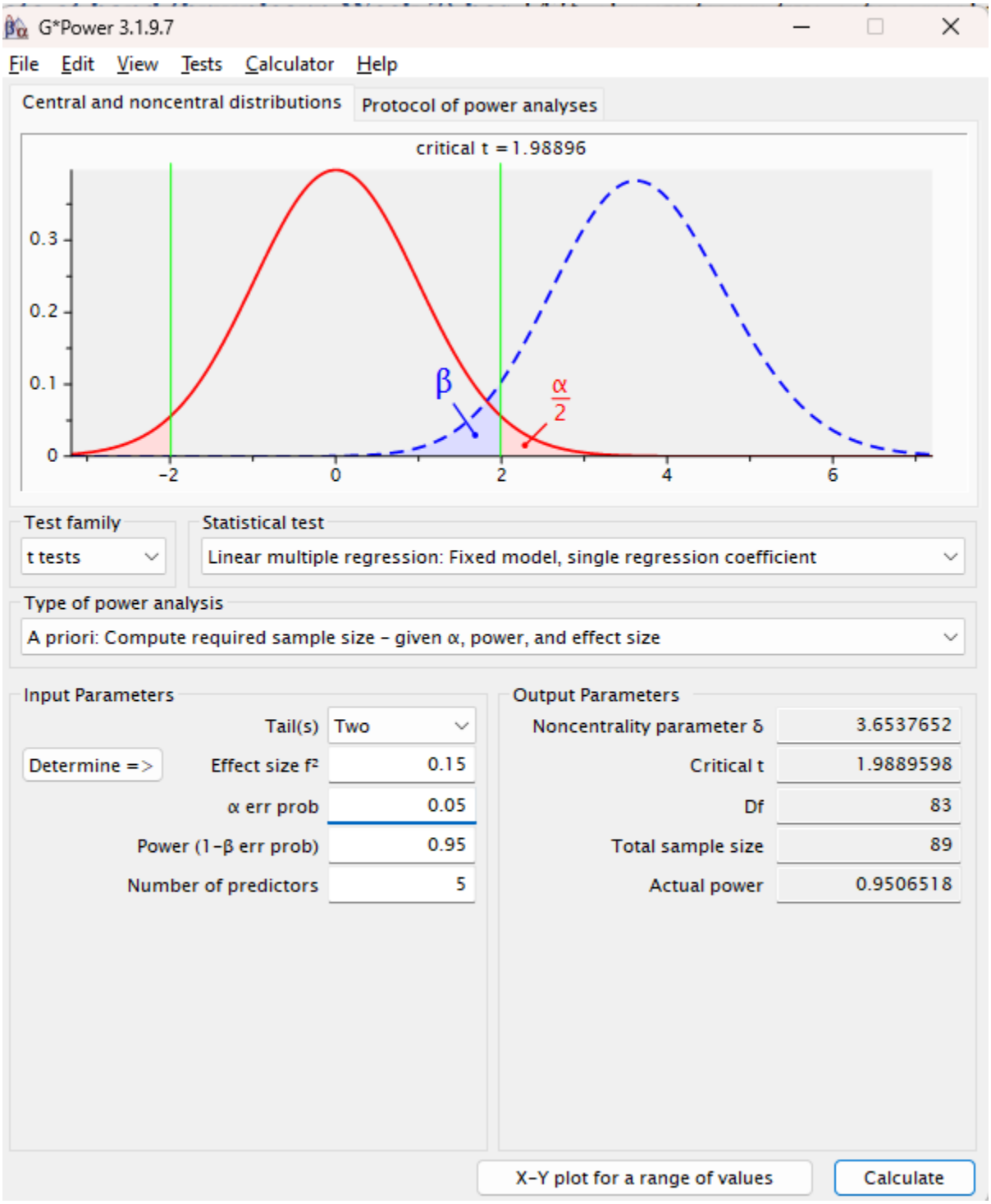
part a)

Social implications of wealth: Which factors predict one's income?

part b)

Randomized Complete Block Design

part c)


G*Power 3.1.9.7
File Edit View Tests Calculator Help
Central and noncentral distributions
Protocol of power analyses
critical t = 1.98896
0.3
0.2
0.1
0
−2
0
2
4
6
β
α/2
Test family
t tests
Statistical test
Linear multiple regression: Fixed model, single regression coefficient
Type of power analysis
A priori: Compute required sample size – given α, power, and effect size
Input Parameters
Tail(s) Two
Determine =>
Effect size f²
0.15
α err prob
0.05
Power (1−β err prob)
0.95
Number of predictors
5
Output Parameters
Noncentrality parameter δ
3.6537652
Critical t
1.9889598
Df
83
Total sample size
89
Actual power
0.9506518
X-Y plot for a range of values
Calculate