PSYCH308A - Data Analysis 5 (DA5)

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```
# Load packages. Set messages and warnings to FALSE so I don't have to see the
# masking messages in the output.
library(psych)
library(jmv)       # for descriptive
library(ggplot2)
library(dplyr)
library(magrittr)
library(stringr)   # for sub_str
library(AER)
```

Data Prep

First we need to load the data

```
# Load the data as a dataframe
reading_dat <- read.csv("./DA5a.csv")

# Assert column names to be lowercase
colnames(reading_dat) <- tolower(colnames(reading_dat))

# Check the structure of the data:
print(head(reading_dat))
```

```
##   age    sex                       race married        married.status
## 1  41 Female Asian or Pacific Islander      No              Divorced
```

```
## 2  26   Male Asian or Pacific Islander      No Living with a partner
## 3  21 Female Asian or Pacific Islander      No Living with a partner
## 4  25 Female Asian or Pacific Islander      No Living with a partner
## 5  35   Male Asian or Pacific Islander     Yes               Married
## 6  37 Female Asian or Pacific Islander     Yes               Married
##                                                 education         employment
## 1 Post-graduate training/professional school after college Employed full-time
## 2                          Some college, no 4-year degree Employed full-time
## 3                          Some college, no 4-year degree Employed full-time
## 4                                       College graduate Employed full-time
## 5 Post-graduate training/professional school after college Employed full-time
## 6 Post-graduate training/professional school after college Employed full-time
##                     incomes how.many.books.did.you.read.during.last.12months.
## 1   $50,000 to under $75,000                                                 2
## 2   $20,000 to under $30,000                                                50
## 3   $40,000 to under $50,000                                                 4
## 4   $50,000 to under $75,041                                                20
## 5 $100,000 to under $150,000                                                16
## 6 $100,000 to under $150,000                                                10
##   read.any.printed.books.during.last.12months.
## 1                                          Yes
## 2                                          Yes
## 3                                          Yes
## 4                                          Yes
## 5                                          Yes
## 6                                          Yes
##   read.any.audiobooks.during.last.12months.
## 1                                        No
## 2                                        No
## 3                                        No
## 4                                        No
## 5                                        No
## 6                                        No
##   read.any.e.books.during.last.12months.
## 1                                     No
## 2                                    Yes
## 3                                     No
## 4                                     No
## 5                                    Yes
## 6                                    Yes
##                          last.book.you.read..you
## 1                Borrowed the book from a library
## 2                             Purchased the book
## 3                             Purchased the book
## 4 Borrowed the book from a friend or family member
## 5                             Purchased the book
## 6                Borrowed the book from a library
##   do.you.happen.to.read.any.daily.news.or.newspapers.
## 1                                                  No
## 2                                                 Yes
## 3                                                  No
## 4                                                 Yes
## 5                                                  No
## 6                                                 Yes
```

```
##   do.you.happen.to.read.any.magazines.or.journals.
## 1                                               No
## 2                                               No
## 3                                              Yes
## 4                                              Yes
## 5                                               No
## 6                                               No
```

```
cat("\n\n")
```

```
str(reading_dat)
```

```
## 'data.frame':    2442 obs. of  15 variables:
##  $ age                                                : int  41 26 21 25 35 37 40 30 55 39 ...
##  $ sex                                                : chr  "Female" "Male" "Female" "Female" ...
##  $ race                                               : chr  "Asian or Pacific Islander" "Asian or Pa
##  $ married                                            : chr  "No" "No" "No" "No" ...
##  $ married.status                                     : chr  "Divorced" "Living with a partner" "Livi
##  $ education                                          : chr  "Post-graduate training/professional sch
##  $ employment                                         : chr  "Employed full-time" "Employed full-time
##  $ incomes                                            : chr  "$50,000 to under $75,000" "$20,000 to u
##  $ how.many.books.did.you.read.during.last.12months.  : int  2 50 4 20 16 10 3 3 3 2 ...
##  $ read.any.printed.books.during.last.12months.       : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ read.any.audiobooks.during.last.12months.          : chr  "No" "No" "No" "No" ...
##  $ read.any.e.books.during.last.12months.             : chr  "No" "Yes" "No" "No" ...
##  $ last.book.you.read..you                            : chr  "Borrowed the book from a library" "Purc
##  $ do.you.happen.to.read.any.daily.news.or.newspapers.: chr  "No" "Yes" "No" "Yes" ...
##  $ do.you.happen.to.read.any.magazines.or.journals.   : chr  "No" "No" "Yes" "Yes" ...
```

```
# Check uniqueness of fields of interrest for upcoming questions
# (sex, education, and employment). We want to make sure that there are not
# equal value inputs that would look different due to things like case or type:
# (e.g. High school graduate and HIGH School Graduatre and High School Complete)
uni_edu = unique(reading_dat$education)
uni_sex = unique(reading_dat$sex)
uni_emp = unique(reading_dat$employment)

# Print the values for inspection
cat("\nUnique values in Education:\n")
```

```
##
## Unique values in Education:
```

```
cat(uni_edu, sep="\n")
```

```
## Post-graduate training/professional school after college
## Some college, no 4-year degree
## College graduate
## High school graduate
## High school incomplete
## Technical, trade or vocational school AFTER high school
## None
```

```
cat("---\n\n")
```

```
## ---
```

```r
cat("\nUnique values in Sex:\n")
```

```
##
## Unique values in Sex:
```

```r
cat(uni_sex, sep="\n")
```

```
## Female
## Male
```

```r
cat("---\n\n")
```

```
## ---
```

```r
cat("\nUnique values in Employment:\n")
```

```
##
## Unique values in Employment:
```

```r
cat(uni_emp, sep="\n")
```

```
## Employed full-time
## Employed part-time
## Have own business/self-employed
## Not employed for pay
## Retired
## Student
## Disabled
```

```r
cat("---\n\n")
```

```
## ---
```

Question 06

Data for Employment and Sex look appropriately unique. So we'll create a visualization (bar chart) for employment sorted by sex. Then we will print contingency tables and run the test

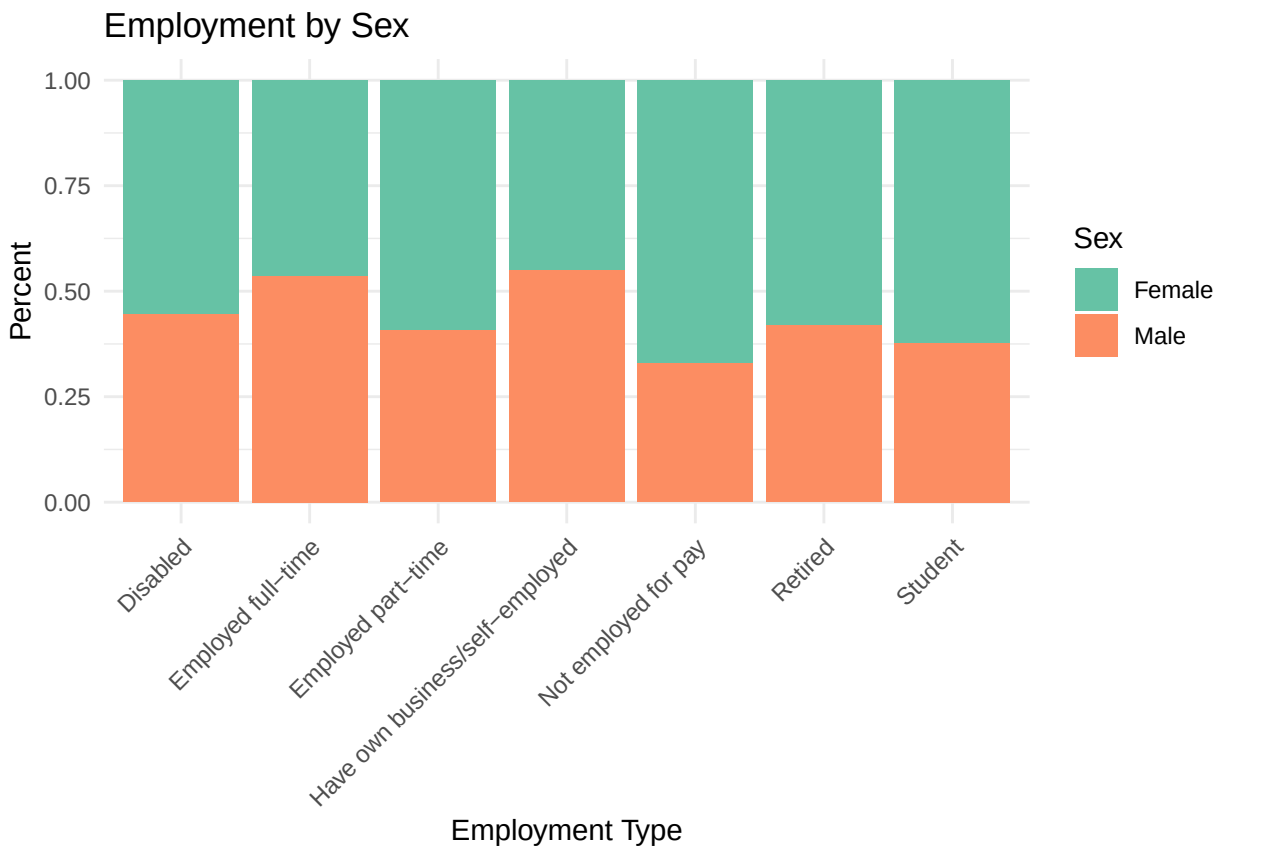
Q06 Visualization

Code below will create two bar-charts, one with the breakdown named by the original employment categories in the data, and one with the same data but labeled by more readable display names. Both are printed so that they can be inspected to ensure names were mapped correctly.

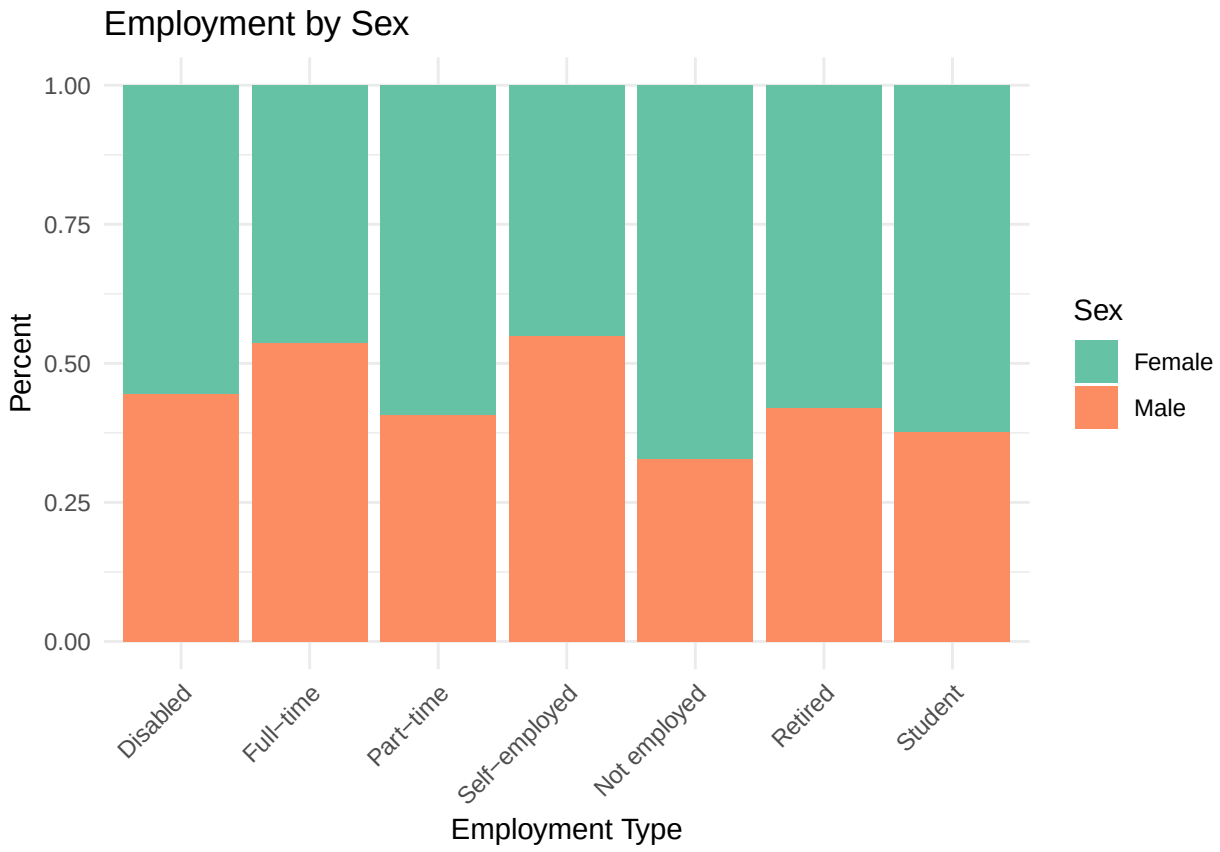
```r
# Create a mapping vector setting each long-name to a shortened display name
emp_disp_name_map = c( "Employed full-time" = "Full-time",
                       "Employed part-time" = "Part-time",
                       "Have own business/self-employed" = "Self-employed",
                       "Not employed for pay" = "Not employed",
                       "Retired" = "Retired",
                       "Student" = "Student",
                       "Disabled" = "Disabled"
                      )

# Bar chart visualization. This code constructs a bar chart that shows each
# employment type broken down by percentage of females vs. percentage of
```

```
# males at that level. Note: Two versions of the same chart are produced, one
# uses default education level names and one with shortened display names. This
# is just to ensure I mapped the display names correctly.
ggplot(reading_dat, aes( x=employment, fill=as.factor(sex) ) ) +
    geom_bar(position = "fill") +
    scale_fill_brewer(palette = "Set2") +
    labs(y = "Percent", x = "Employment Type", fill= "Sex", title = "Employment by Sex") +
    theme_minimal() +
    theme( axis.text.x = element_text(angle = 45, hjust = 1) )
```




```
ggplot(reading_dat, aes( x=employment, fill=as.factor(sex) ) ) +
    geom_bar(position = "fill") +
    scale_fill_brewer(palette = "Set2") +
    scale_x_discrete(labels = emp_disp_name_map) +
    labs(y = "Percent", x = "Employment Type", fill= "Sex", title = "Employment by Sex") +
    theme_minimal() +
    theme( axis.text.x = element_text(angle = 45, hjust = 1) )
```



Q06 Contingency Table

```
# We create a table for consumption
emp_v_sex_tab <- prop.table( xtabs(~ sex +  employment, data = reading_dat), 1 )
round(emp_v_sex_tab, 2)
```

```
##         employment
## sex      Disabled Employed full-time Employed part-time
##   Female     0.02               0.37               0.14
##   Male       0.02               0.50               0.12
##         employment
## sex      Have own business/self-employed Not employed for pay Retired Student
##   Female                            0.02                 0.20    0.22    0.02
##   Male                              0.03                 0.12    0.19    0.02
```

Q06 NHST

```
jmv::contTables(data = reading_dat,
                rows="sex", cols="employment",
                exp=TRUE,
                phiCra=TRUE
                )
```

```
##
##  CONTINGENCY TABLES
##
```

```
##  Contingency Tables
##
##    sex                    Disabled    Employed full-time    Employed part-time    Have own business/s
##
##    Female     Observed          30                   486                   191
##               Expected    29.38821              570.3489              175.2408
##
##    Male       Observed          24                   562                   131
##               Expected    24.61179              477.6511              146.7592
##
##    Total      Observed          54                  1048                   322
##               Expected    54.00000              1048.0000             322.0000
##
##
##
##   ² Tests
##
##           Value       df    p
##
##      ²    62.98363     6    < .0000001
##    N          2442
##
##
##
##  Nominal
##
##                         Value
##
##    Phi-coefficient          NaN
##    Cramer's V         0.1605983
##
```

Question 07

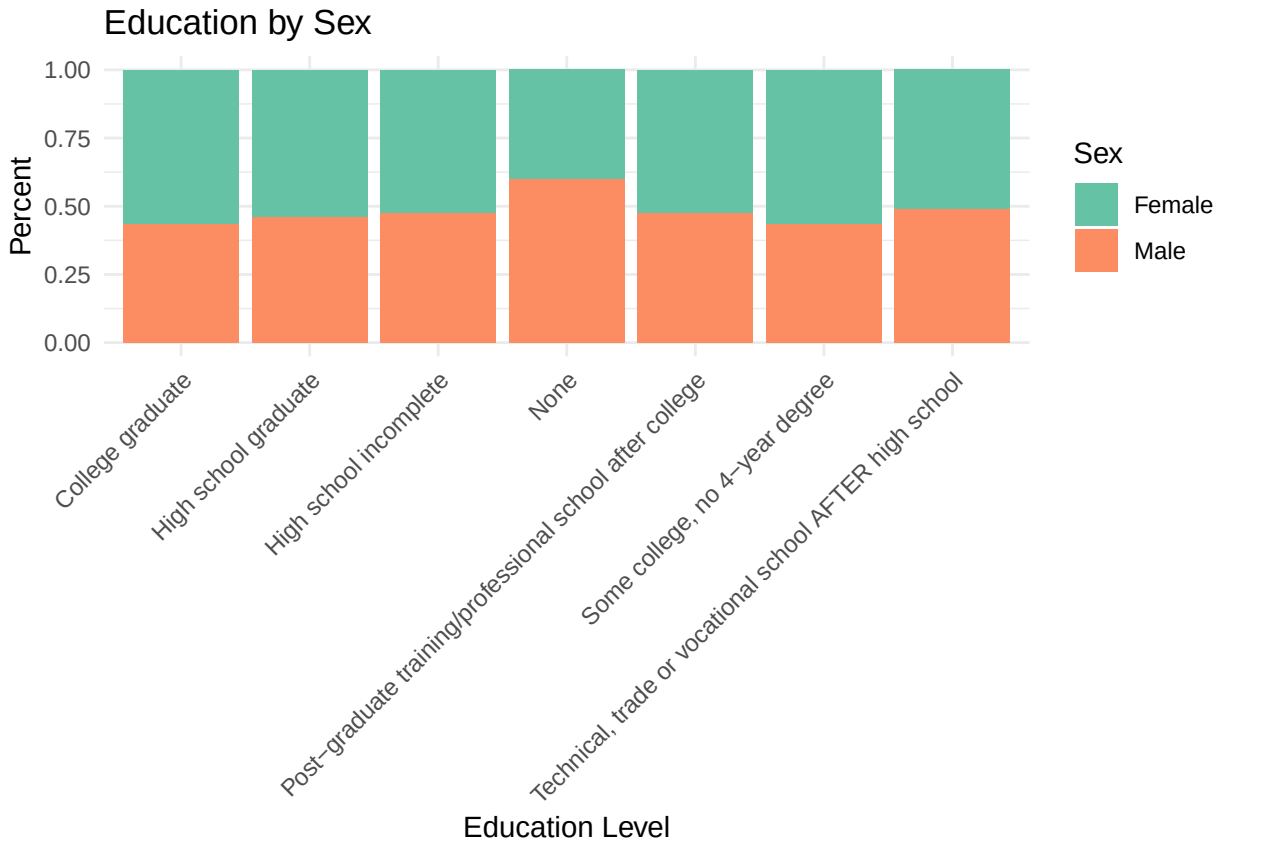
Data for Education and Sex look appropriately unique. So we'll create a visualization (bar chart) for education sorted by sex. Then we will print contingency tables and run the test

Q07 Visualization

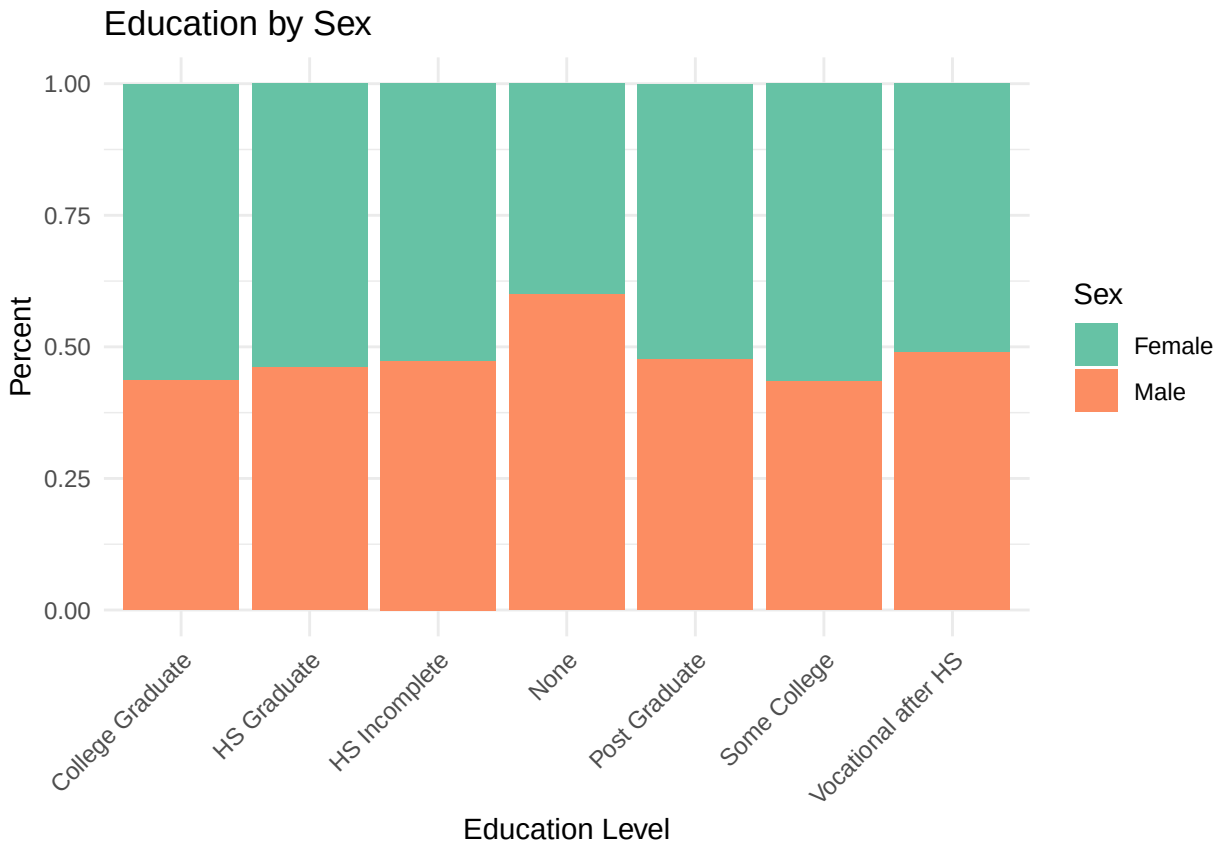
```
# Create a mapping vector setting each long-name to a shortened display name
edu_disp_name_map = c( "Post-graduate training/professional school after college" = "Post Graduate",
                       "Some college, no 4-year degree" = "Some College",
                       "College graduate" = "College Graduate",
                       "High school graduate" = "HS Graduate",
                       "High school incomplete" = "HS Incomplete",
                       "Technical, trade or vocational school AFTER high school" = "Vocational after HS
                       "None" = "None"
                      )

# Bar chart visualization. This code constructs a bar chart that shows each
# level of education broken down by percentage of females vs. percentage of
# males at that level. Note: Two versions of the same chart are produced, one
```

```
# default education level names and one with shortened display names. This is
# just to ensure I mapped the display names correctly.
ggplot(reading_dat, aes( x=education, fill=as.factor(sex) ) ) +
    geom_bar(position = "fill") +
    scale_fill_brewer(palette = "Set2") +
    labs(y = "Percent", x = "Education Level", fill= "Sex", title = "Education by Sex") +
    theme_minimal() +
    theme( axis.text.x = element_text(angle = 45, hjust = 1) )
```




```
ggplot(reading_dat, aes( x=education, fill=as.factor(sex) ) ) +
    geom_bar(position = "fill") +
    scale_fill_brewer(palette = "Set2") +
    scale_x_discrete(labels = edu_disp_name_map) +
    labs(y = "Percent", x = "Education Level", fill= "Sex", title = "Education by Sex") +
    theme_minimal() +
    theme( axis.text.x = element_text(angle = 45, hjust = 1) )
```



Q07 Contingency Table

```
# We create a table for consumption
edu_v_sex_tab <- prop.table( xtabs(~ sex + education, data = reading_dat), 1 )
round(edu_v_sex_tab, 2)
```

```
##         education
## sex      College graduate High school graduate High school incomplete None
##   Female             0.24                 0.21                    0.08 0.01
##   Male               0.22                 0.22                    0.09 0.02
##         education
## sex      Post-graduate training/professional school after college
##   Female                                                     0.19
##   Male                                                       0.21
##         education
## sex      Some college, no 4-year degree
##   Female                           0.25
##   Male                             0.23
##         education
## sex      Technical, trade or vocational school AFTER high school
##   Female                                                    0.02
##   Male                                                      0.02
```

Q07 NHST

```
jmv::contTables(data = reading_dat,
                rows="sex", cols="education",
                exp=TRUE,
                phiCra=TRUE
                )
```

```
##
##  CONTINGENCY TABLES
##
##  Contingency Tables
##
##    sex                  College graduate    High school graduate    High school incomplete    None
##
##    Female    Observed               317                     281                       108
##              Expected           305.8550                284.0860                  111.56634    21.76
##
##    Male      Observed               245                     241                        97
##              Expected           256.1450                237.9140                   93.43366    18.23
##
##    Total     Observed               562                     522                       205
##              Expected           562.0000                522.0000                  205.00000    40.00
##
##
##
##   ² Tests
##
##          Value       df    p
##
##     ²    6.778156     6    0.3418515
##    N         2442
##
##
##
##  Nominal
##
##                       Value
##
##    Phi-coefficient          NaN
##    Cramer's V         0.05268451
##
```

Question 08

R was not used in any capacity for this question.