The results below are generated from an R script.

```
# Assignment: ASSIGNMENT 2
# Name: Chattapadhyay, Kausik
# Date: 2022-09-08

## Check your current working directory using `getwd()`
getwd()

## [1] "/Users/kausik/Desktop/MS Data Science/DSC 520/dsc520-stats-r-assignments/assignments/assignment0

## List the contents of the working directory with the `dir()` function
dir()

## [1] "assignment_02_ChattapadhyayKausik.pdf" "assignment_02_ChattapadhyayKausik.R"

## If the current directory does not contain the `data` directory, set the
## working directory to project root folder (the folder should contain the `data` directory
## Use `setwd()` if needed
setwd("/Users/kausik/Desktop/MS Data Science/DSC 520/dsc520-stats-r-assignments")

## Load the file `data/tidynomicon/person.csv` to `person_df1` using `read.csv`
## Examine the structure of `person_df1` using `str()`
person_df1 <- read.csv(file="data/tidynomicon/person.csv", header = TRUE, stringsAsFactors = TRUE)
str(person_df1)

## 'data.frame': 5 obs. of  3 variables:
##  $ person_id    : Factor w/ 5 levels "danforth","dyer",..: 2 4 3 5 1
##  $ personal_name: Factor w/ 4 levels "Anderson","Frank",..: 4 2 1 3 2
##  $ family_name  : Factor w/ 5 levels "Danforth","Dyer",..: 2 4 3 5 1

## R interpreted names as factors, which is not the behavior we want
## Load the same file to person_df2 using `read.csv` and setting `stringsAsFactors` to `FALSE`
## Examine the structure of `person_df2` using `str()`
person_df2 <- read.csv(file="data/tidynomicon/person.csv", stringsAsFactors = FALSE)
str(person_df2)

## 'data.frame': 5 obs. of  3 variables:
##  $ person_id    : chr  "dyer" "pb" "lake" "roe" ...
##  $ personal_name: chr  "William" "Frank" "Anderson" "Valentina" ...
##  $ family_name  : chr  "Dyer" "Pabodie" "Lake" "Roerich" ...

## Read the file `data/scores.csv` to `scores_df`
## Display summary statistics using the `summary()` function
scores_df <- read.csv(file="data/scores.csv")
summary(scores_df)

##      Count           Score         Section
##  Min.   :10.00   Min.   :200.0   Length:38
##  1st Qu.:10.00   1st Qu.:300.0   Class :character
##  Median :10.00   Median :322.5   Mode  :character
##  Mean   :14.47   Mean   :317.5
##  3rd Qu.:20.00   3rd Qu.:357.5
##  Max.   :30.00   Max.   :395.0
```

```r
## Load the `readxl` library
library(readxl)

## Using the excel_sheets() function from the `readxl` package,
## list the worksheets from the file `data/G04ResultsDetail2004-11-02.xls`
excel_sheets("data/G04ResultsDetail2004-11-02.xls")
```

```
##  [1] "Instructions"          "Voter Turnout"         "President"
##  [4] "House of Rep"          "Co Clerk"              "Co Reg Deeds"
##  [7] "Co Public Defender"    "Co Comm 1"             "Co Comm 3"
## [10] "Co Comm 5"             "Co Comm 7"             "St Bd of Ed 2"
## [13] "St Bd of Ed 4"         "Legislature 5"         "Legislature 7"
## [16] "Legislature 9"         "Legislature 11"        "Legislature 13"
## [19] "Legislature 23"        "Legislature 31"        "Legislature 39"
## [22] "MCC 1"                 "MCC 2"                 "MCC 3"
## [25] "MCC 4"                 "OPPD"                  "MUD"
## [28] "NRD 3"                 "NRD 5"                 "NRD 7"
## [31] "NRD 9"                 "OPS 2"                 "OPS 4"
## [34] "OPS 6"                 "OPS 8"                 "OPS 10"
## [37] "OPS 11"                "OPS 12"                "ESU 2"
## [40] "ESU 3"                 "Arlington Sch 24"      "Bennington Sch 59"
## [43] "Elkhorn Sch 10"        "Fremont Sch 1"         "Ft Calhoun Sch 3"
## [46] "Gretna Sch 37"         "Millard Sch 17"        "Ralston Sch 54"
## [49] "Valley Sch 33"         "Waterloo Sch 11"       "Bennington Mayor"
## [52] "Elkhorn Mayor"         "Valley Mayor"          "Ralston Mayor"
## [55] "Ralston Library Bd"    "Bennington City Cnc 1" "Bennington City Cnc 2"
## [58] "Elkhorn City Cnc A"    "Elkhorn City Cnc B"    "Elkhorn City Cnc C"
## [61] "Ralston City Cnc 1"    "Ralston City Cnc 2"    "Ralston City Cnc 6"
## [64] "Waterloo Bd Trustees"  "Valley City Cnc"       "Amendment 1"
## [67] "Amendment 2"           "Amendment 3"           "Amendment 4"
## [70] "Initiative 417"        "Initiative 418"        "Initiative 419"
## [73] "Initiative 420"
```

```r
## Using the `read_excel` function, read the Voter Turnout sheet
## from the `data/G04ResultsDetail2004-11-02.xls`
## Assign the data to the `voter_turnout_df1`
## The header is in the second row, so make sure to skip the first row
## Examine the structure of `voter_turnout_df1` using `str()`

voter_turnout_df1 <- read_excel("data/G04ResultsDetail2004-11-02.xls", sheet="Voter Turnout", skip = 1)
str(voter_turnout_df1)
```

```
## tibble [342 x 4] (S3: tbl_df/tbl/data.frame)
##  $ Ward Precinct    : chr [1:342] "01-01" "01-02" "01-03" "01-04" ...
##  $ Ballots Cast     : num [1:342] 421 443 705 827 527 323 358 410 440 500 ...
##  $ Registered Voters: num [1:342] 678 691 1148 1308 978 ...
##  $ Voter Turnout    : num [1:342] 0.621 0.641 0.614 0.632 0.539 ...
```

```r
## Using the `read_excel()` function, read the Voter Turnout sheet
## from `data/G04ResultsDetail2004-11-02.xls`
## Skip the first two rows and manually assign the columns using `col_names`
## Use the names "ward_precint", "ballots_cast", "registered_voters", "voter_turnout"
## Assign the data to the `voter_turnout_df2`
## Examine the structure of `voter_turnout_df2` using `str()`
voter_turnout_df2 <- read_excel("data/G04ResultsDetail2004-11-02.xls", sheet="Voter Turnout", skip=2,
```

```
                                col_names = c("ward_precint", "ballots_cast", "registered_voters", "vote
str(voter_turnout_df2)

## tibble [342 x 4] (S3: tbl_df/tbl/data.frame)
##  $ ward_precint     : chr [1:342] "01-01" "01-02" "01-03" "01-04" ...
##  $ ballots_cast     : num [1:342] 421 443 705 827 527 323 358 410 440 500 ...
##  $ registered_voters: num [1:342] 678 691 1148 1308 978 ...
##  $ voter_turnout    : num [1:342] 0.621 0.641 0.614 0.632 0.539 ...

## Load the `DBI` library
library('DBI')
## Create a database connection to `data/tidynomicon/example.db` using the dbConnect() function
## The first argument is the database driver which in this case is `RSQLite::SQLite()`
## The second argument is the path to the database file
## Assign the connection to `db` variable
db <- dbConnect(RSQLite::SQLite(),"data/tidynomicon/example.db")

## Query the Person table using the `dbGetQuery` function and the
## `SELECT * FROM PERSON;` SQL statement
## Assign the result to the `person_df` variable
## Use `head()` to look at the first few rows of the `person_df` dataframe
person_df <- dbGetQuery(db, "SELECT * FROM PERSON")
head(person_df)

##   person_id personal_name family_name
## 1      dyer       William        Dyer
## 2        pb         Frank     Pabodie
## 3      lake      Anderson        Lake
## 4       roe     Valentina     Roerich
## 5  danforth         Frank    Danforth

## List the tables using the `dbListTables()` function
## Assign the result to the `table_names` variable
table_names <- dbListTables(db)

## Read all of the tables at once using the `lapply` function and assign the result to the `tables` var
## Use `table_names`, `dbReadTable`, and `conn = db` as arguments
## Print out the tables
tables <- lapply(table_names, dbReadTable, con = db)

## Warning in result_fetch(res@ptr, n = n): Column `reading`: mixed type, first seen values
of type real, coercing other values of type string

tables

## [[1]]
##    visit_id person_id quantity reading
## 1       619      dyer      rad    9.82
## 2       619      dyer      sal    0.13
## 3       622      dyer      rad    7.80
## 4       622      dyer      sal    0.09
## 5       734        pb      rad    8.41
## 6       734      lake      sal    0.05
## 7       734        pb     temp  -21.50
## 8       735        pb      rad    7.22
```

```
## 9       735      <NA>      sal    0.06
## 10      735      <NA>     temp  -26.00
## 11      751        pb      rad    4.35
## 12      751        pb     temp  -18.50
## 13      751      lake      sal    0.00
## 14      752      lake      rad    2.19
## 15      752      lake      sal    0.09
## 16      752      lake     temp  -16.00
## 17      752       roe      sal   41.60
## 18      837      lake      rad    1.46
## 19      837      lake      sal    0.21
## 20      837       roe      sal   22.50
## 21      844       roe      rad   11.25
##
## [[2]]
##   person_id personal_name family_name
## 1      dyer       William        Dyer
## 2        pb         Frank     Pabodie
## 3      lake      Anderson        Lake
## 4       roe     Valentina     Roerich
## 5  danforth         Frank    Danforth
##
## [[3]]
##   site_id latitude longitude
## 1    DR-1   -49.85   -128.57
## 2    DR-3   -47.15   -126.72
## 3   MSK-4   -48.87   -123.40
##
## [[4]]
##   visit_id site_id visit_date
## 1      619    DR-1 1927-02-08
## 2      622    DR-1 1927-02-10
## 3      734    DR-3 1930-01-07
## 4      735    DR-3 1930-01-12
## 5      751    DR-3 1930-02-26
## 6      752    DR-3       <NA>
## 7      837   MSK-4 1932-01-14
## 8      844    DR-1 1932-03-22
```

```
## Use the 'dbDisconnect' function to disconnect from the database
dbDisconnect(db)

## Import the 'jsonlite' library
library(jsonlite)
library(rjson)
scores_df
```

```
##    Count Score Section
## 1     10   200  Sports
## 2     10   205  Sports
## 3     20   235  Sports
## 4     10   240  Sports
## 5     10   250  Sports
## 6     10   265 Regular
```

```
## 7     10   275 Regular
## 8     30   285  Sports
## 9     10   295 Regular
## 10    10   300 Regular
## 11    20   300  Sports
## 12    10   305  Sports
## 13    10   305 Regular
## 14    10   310 Regular
## 15    10   310  Sports
## 16    20   320 Regular
## 17    10   305 Regular
## 18    10   315  Sports
## 19    20   320 Regular
## 20    10   325 Regular
## 21    10   325  Sports
## 22    20   330 Regular
## 23    10   330  Sports
## 24    30   335  Sports
## 25    10   335 Regular
## 26    20   340 Regular
## 27    10   340  Sports
## 28    30   350 Regular
## 29    20   360 Regular
## 30    10   360  Sports
## 31    20   365 Regular
## 32    20   365  Sports
## 33    10   370  Sports
## 34    10   370 Regular
## 35    20   375 Regular
## 36    10   375  Sports
## 37    20   380 Regular
## 38    10   395  Sports
```

```
## Convert the scores_df dataframe to JSON using the `toJSON()` function
jsonlite::toJSON(scores_df)
```

```
## [{"Count":10,"Score":200,"Section":"Sports"},{"Count":10,"Score":205,"Section":"Sports"},{"Count":20,
```

```
## Convert the scores dataframe to JSON using the `toJSON()` function with the `pretty=TRUE` option
jsonlite::toJSON(scores_df, pretty = TRUE, na="null")
```

```
## [
##   {
##     "Count": 10,
##     "Score": 200,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 205,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 235,
```

```
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 240,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 250,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 265,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 275,
##     "Section": "Regular"
##   },
##   {
##     "Count": 30,
##     "Score": 285,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 295,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 300,
##     "Section": "Regular"
##   },
##   {
##     "Count": 20,
##     "Score": 300,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 305,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 305,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
```

```
##     "Score": 310,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 310,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 320,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 305,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 315,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 320,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 325,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 325,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 330,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 330,
##     "Section": "Sports"
##   },
##   {
##     "Count": 30,
##     "Score": 335,
##     "Section": "Sports"
##   },
##   {
```

```
##     "Count": 10,
##     "Score": 335,
##     "Section": "Regular"
##   },
##   {
##     "Count": 20,
##     "Score": 340,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 340,
##     "Section": "Sports"
##   },
##   {
##     "Count": 30,
##     "Score": 350,
##     "Section": "Regular"
##   },
##   {
##     "Count": 20,
##     "Score": 360,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 360,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 365,
##     "Section": "Regular"
##   },
##   {
##     "Count": 20,
##     "Score": 365,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 370,
##     "Section": "Sports"
##   },
##   {
##     "Count": 10,
##     "Score": 370,
##     "Section": "Regular"
##   },
##   {
##     "Count": 20,
##     "Score": 375,
##     "Section": "Regular"
##   },
```

```
##   {
##     "Count": 10,
##     "Score": 375,
##     "Section": "Sports"
##   },
##   {
##     "Count": 20,
##     "Score": 380,
##     "Section": "Regular"
##   },
##   {
##     "Count": 10,
##     "Score": 395,
##     "Section": "Sports"
##   }
## ]
```

The R session information (including the OS info, R version and all packages used):

```
sessionInfo()

## R version 4.0.0 (2020-04-24)
## Platform: x86_64-apple-darwin17.0 (64-bit)
## Running under: macOS Catalina 10.15.7
##
## Matrix products: default
## BLAS:   /System/Library/Frameworks/Accelerate.framework/Versions/A/Frameworks/vecLib.framework/Versio
## LAPACK: /Library/Frameworks/R.framework/Versions/4.0/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] rjson_0.2.21   jsonlite_1.8.0 DBI_1.1.3      readxl_1.4.0
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_1.0.8.3     rstudioapi_0.14  knitr_1.40       magrittr_2.0.3   bit_4.0.4
##  [6] rlang_1.0.2      fastmap_1.1.0    fansi_1.0.3      highr_0.9        stringr_1.4.1
## [11] blob_1.2.3       tools_4.0.0      xfun_0.30        utf8_1.2.2       cli_3.2.0
## [16] ellipsis_0.3.2   bit64_4.0.5      tibble_3.1.6     lifecycle_1.0.1  vctrs_0.4.0
## [21] evaluate_0.16    memoise_2.0.1    glue_1.6.2       cachem_1.0.6     RSQLite_2.2.12
## [26] stringi_1.7.6    compiler_4.0.0   pillar_1.8.1     cellranger_1.1.0 pkgconfig_2.0.3

Sys.time()

## [1] "2022-09-09 16:04:20 EDT"
```