512_HW3

September 11, 2025

1 Homework 03 - Nonstandard Evaluation and Git

1.1 Nonstandard Evaluation

1.1.1 Question 1

Imagine we have a data frame called `data`, with a `type` column. Which one works and why?
Function 1:

```
group_and_tally <- function(df, column){
    df %>% group_by({{ column }}) %>% tally();
}
group_and_tally(data, type);
```

Function 2:

```
group_and_tally <- function(df, column){
    df %>% group_by(column) %>% tally();
}
group_and_tally(data, type);
```

Function 1 works because it uses tidyverse nonstandard evaluation which tells group_by to evaluate the argument in the context of the data frame's columns so type is evaluated as a column. Function 2 does not work because column is evaluated ad a variable name and not the column of the data frame. It tries to group by a column called column which doesnt exist so it will not work.

1.2 Git

For the questions below, please add the commands you used to complete these steps.

1.2.1 Question 2

Set up your git repo on your local computer. If you already make a git repo on GitHub, but it isn't on your local computer - clone it.

bash

cd bios611

git clone https://github.com/AlexisBryant-25/BIOS_____512.git

cd BIOS_____512

git remote -v

1.2.2 Question 3

Set up your SSH key.

bash

ssh-keygen -t ed22519 -c "albry@unc.edu"

eval "$(ssh-agent -s)"

ssh-add ~./ssh/id_ed25519

cat ~/.ssh/id_ed25519.pub

ssh -T git@github.com

Then I copy and pasted the output from the last command in github under create a new SSH key and saved it under the name "Laptop Key".

1.2.3 Question 4

a) Add a HW2 directory to your git repo through the terminal with a HW.md file that says "This is for homework 2."

bash

cd BIOS_____512

mkdir HW2

cd HW2

echo "This is for homeowrk 2." > HW.md

b) *Add* HW2.md to the staging area. Then, use the command to see which files have been modified, staged for commit, or are untracked. What does it show? They should copy paste the terminal response after git status, and show that key used the commands below.

bash

git add HW.md

git status

It shows:

On main branch

Your branch is up to date with 'origin/main'

Changes to be committed:

(use "git restore –staged ..." to unstage)

new file: HW.md

c) Save file changes to the main branch

bash

git commit -m "Add HW2 directory with HW.md file"

d) Now, edit the HW2.md file to give it a title.

bash

ech0 "# Homework 2" | cat - HW.md > temp && mv temp HW.md

e) Use the command that compares current, unsaved changes to the main branch. What does it say?

bash #### git diff

It shows that I added a title to the HW.md file. It shows + #Homework2

f) Use the command that checks the status of the working directory and the staging area *again*. What does it say?

bash

git status

It says: One branch main

On branch main. Your branch is up to date with 'Origin/main'

Changes not staged for commmit:

(use "git add ..." to update what will be committed)

(use "git restore ..." to discard changes in working directory)

modified: HW.md

no changes added to commit (use "git add" and/or "git commit -a")

g) Once again, add HW2.md to the staging area and save the file changes to the main branch. Then, get use the command that gives you project history and paste the output in your homework. #### bash #### git add HW.md #### git commit -m "Update HW.md with new changes"

h) Do some searching... What `git` command will provide you documentation on other commands? Use that command to find documentation on `git log` and `git show`. What does `--since` mean in regards to `git log`? Copy and paste what is written in the documentation.

bash

git help log

–since in regards to git log means that you want to show or find commits that are on or before a certain date (more recent).

–since=

–after=

Show commits more recent than .

–since-as-filter=

Show all commits more recent than . This visits all commits in the range, rather than stopping at the first commit which is older than .

1.3 Tidyverse

Note: Please make sure Binder is set up correctly to run this section. You can follow the instructions here: https://github.com/rjenki/BIOS512.

Please show your code for this section! Before completing this section, please run the following.

[1]:
```
library(tidyverse)
if (!dir.exists("intermediate")) dir.create("intermediate", recursive = TRUE)
if (!exists("mdpre")) mdpre <- function(x) { print(x) }
if (!exists("ggmd"))  ggmd  <- function(p) { print(p) }
```

```
  Attaching core tidyverse packages                tidyverse
2.0.0
 dplyr     1.1.2      readr     2.1.4
 forcats   1.0.0      stringr   1.5.0
 ggplot2   3.4.2      tibble    3.2.1
 lubridate 1.9.2      tidyr     1.3.0
 purrr     1.0.1
  Conflicts
tidyverse_conflicts()
 dplyr::filter() masks stats::filter()
 dplyr::lag()    masks stats::lag()
 Use the conflicted package
(<http://conflicted.r-lib.org/>) to force all conflicts to
become errors
```

1.3.1 Question 5

Download the patient_names.csv and patient_properties.csv files from Canvas and read them into R. Manually set the date columns to be date variables. Print the first 10 observations of each.

[2]:
```
library(readr)
library (tidyverse)
Patient_names <- read_csv("patient_names.csv")
Patient_properties <- read_csv("patient_properties.csv")


Patient_names$BIRTHDATE <- as.Date(Patient_names$BIRTHDATE, format = '%m/%d/%y')
Patient_names$DEATHDATE <- as.Date(Patient_names$DEATHDATE, format = '%m/%d/%y')

head(Patient_names, 10)
head(Patient_properties, 10)
```

```
Rows: 974 Columns: 7
  Column specification

Delimiter: ","
chr (7): ID, BIRTHDATE, DEATHDATE, FIRST, LAST, CITY, STATE

 Use `spec()` to retrieve the full column specification for this
data.
 Specify the column types or set `show_col_types = FALSE` to quiet
this message.
Rows: 3896 Columns: 3
```

```
  Column specification

Delimiter: ","
chr (3): ID, property, value

  Use `spec()` to retrieve the full column specification for this
data.
  Specify the column types or set `show_col_types = FALSE` to quiet
this message.
```

A tibble: 10 × 7

ID <chr>	BIRTHDATE <date>	DEATHDATE <date>	FIRST <chr>	LAST <chr>
5605b66b-e92d-c16c-1b83-b8bf7040d51f	1977-03-19	NA	Nikita578	Erdma
6e5ae27c-8038-7988-e2c0-25a103f01bfa	2040-02-19	NA	Zane918	Hodkie
8123d076-0886-9007-e956-d5864aa121a7	2058-06-04	NA	Quinn173	Marqu
770518e4-6133-648e-60c9-071eb2f0e2ce	2028-12-25	2017-09-29	Abel832	Smitha
f96addf5-81b9-0aab-7855-d208d3d352c5	2028-12-25	2014-02-23	Edwin773	Labadi
8e9650d1-788a-78f9-4a28-d08f7f95354a	2028-12-25	NA	Frankie174	Oberbr
183df435-4190-060e-8f8e-bf63c572b266	2057-11-08	NA	Eilene124	Walsh5
720560d4-51da-c38c-ee90-c15935278df1	1972-06-27	NA	Lowell343	Price92
217851b0-5f47-d376-18b9-0fe4ba77207e	2054-03-06	NA	Adrian111	Gleaso
ff331e5c-ab16-e218-f39a-63e11de1ed75	2027-07-10	NA	Eugene421	Aberna

A tibble: 10 × 3

ID <chr>	property <chr>	value <chr>
5605b66b-e92d-c16c-1b83-b8bf7040d51f	MARITAL	M
5605b66b-e92d-c16c-1b83-b8bf7040d51f	RACE	white
5605b66b-e92d-c16c-1b83-b8bf7040d51f	ETHNICITY	nonhispanic
5605b66b-e92d-c16c-1b83-b8bf7040d51f	GENDER	F
6e5ae27c-8038-7988-e2c0-25a103f01bfa	MARITAL	M
6e5ae27c-8038-7988-e2c0-25a103f01bfa	RACE	white
6e5ae27c-8038-7988-e2c0-25a103f01bfa	ETHNICITY	nonhispanic
6e5ae27c-8038-7988-e2c0-25a103f01bfa	GENDER	M
8123d076-0886-9007-e956-d5864aa121a7	MARITAL	M
8123d076-0886-9007-e956-d5864aa121a7	RACE	white

1.3.2 Question 6

In the data frame pulled from patient_properties, you'll notice that the data is long, not wide. Do a pivot to make the properties their own columns. Print the first 10 observations after you do so.

[3]:
```
patient_wide <- Patient_properties %>%
    pivot_wider(
        id_cols = ID,
        names_from = property,
        values_from = value
    )
head(patient_wide, 10)
```

A tibble: 10 × 5

ID <chr>	MARITAL <chr>	RACE <chr>	ETHNICITY <chr>	GENDER <chr>
5605b66b-e92d-c16c-1b83-b8bf7040d51f	M	white	nonhispanic	F
6e5ae27c-8038-7988-e2c0-25a103f01bfa	M	white	nonhispanic	M
8123d076-0886-9007-e956-d5864aa121a7	M	white	nonhispanic	M
770518e4-6133-648e-60c9-071eb2f0e2ce	M	white	hispanic	M
f96addf5-81b9-0aab-7855-d208d3d352c5	M	white	hispanic	M
8e9650d1-788a-78f9-4a28-d08f7f95354a	M	white	hispanic	M
183df435-4190-060e-8f8e-bf63c572b266	M	asian	nonhispanic	F
720560d4-51da-c38c-ee90-c15935278df1	M	white	nonhispanic	M
217851b0-5f47-d376-18b9-0fe4ba77207e	S	black	hispanic	M
ff331e5c-ab16-e218-f39a-63e11de1ed75	M	native	hispanic	M

1.3.3 Question 7

Perform a left join of the names and properties_wide data frames by the ID column and print the first 10 rows.

[4]:
```
patients_full <- Patient_names %>%
    left_join(patient_wide, by = "ID")
head(patients_full, 10)
```

A tibble: 10 × 11

ID <chr>	BIRTHDATE <date>	DEATHDATE <date>	FIRST <chr>	LAST <chr>
5605b66b-e92d-c16c-1b83-b8bf7040d51f	1977-03-19	NA	Nikita578	Erdm
6e5ae27c-8038-7988-e2c0-25a103f01bfa	2040-02-19	NA	Zane918	Hodk
8123d076-0886-9007-e956-d5864aa121a7	2058-06-04	NA	Quinn173	Marq
770518e4-6133-648e-60c9-071eb2f0e2ce	2028-12-25	2017-09-29	Abel832	Smith
f96addf5-81b9-0aab-7855-d208d3d352c5	2028-12-25	2014-02-23	Edwin773	Labac
8e9650d1-788a-78f9-4a28-d08f7f95354a	2028-12-25	NA	Frankie174	Oberb
183df435-4190-060e-8f8e-bf63c572b266	2057-11-08	NA	Eilene124	Walsh
720560d4-51da-c38c-ee90-c15935278df1	1972-06-27	NA	Lowell343	Price
217851b0-5f47-d376-18b9-0fe4ba77207e	2054-03-06	NA	Adrian111	Gleas
ff331e5c-ab16-e218-f39a-63e11de1ed75	2027-07-10	NA	Eugene421	Aber

1.3.4 Question 8

Notice something interesting about the names in our data set. Fix the name formatting and print the first 10 observations.

[5]:
```
library(tidyverse)

patients_full <- patients_full %>%
  mutate(
    FIRST = str_remove(FIRST, "[0-9]+$"),
    LAST  = str_remove(LAST, "[0-9]+$")
  )
head(patients_full, 10)
```

A tibble: 10 × 11

ID <chr>	BIRTHDATE <date>	DEATHDATE <date>	FIRST <chr>	LAST <chr>
5605b66b-e92d-c16c-1b83-b8bf7040d51f	1977-03-19	NA	Nikita	Erdman
6e5ae27c-8038-7988-e2c0-25a103f01bfa	2040-02-19	NA	Zane	Hodkiewi
8123d076-0886-9007-e956-d5864aa121a7	2058-06-04	NA	Quinn	Marquard
770518e4-6133-648e-60c9-071eb2f0e2ce	2028-12-25	2017-09-29	Abel	Smitham
f96addf5-81b9-0aab-7855-d208d3d352c5	2028-12-25	2014-02-23	Edwin	Labadie
8e9650d1-788a-78f9-4a28-d08f7f95354a	2028-12-25	NA	Frankie	Oberbrun
183df435-4190-060e-8f8e-bf63c572b266	2057-11-08	NA	Eilene	Walsh
720560d4-51da-c38c-ee90-c15935278df1	1972-06-27	NA	Lowell	Price
217851b0-5f47-d376-18b9-0fe4ba77207e	2054-03-06	NA	Adrian	Gleason
ff331e5c-ab16-e218-f39a-63e11de1ed75	2027-07-10	NA	Eugene	Abernath

1.3.5 Question 9

Using a for statement to loop through the categorical variables (excluding name and ID), print the counts of each unique value in descending order, using the mdpre() function for formatting.

[6]:
```
exclude_cols <- c("ID", "FIRST", "LAST")

for(col in colnames(patients_full)) {
    if(!(col %in% exclude_cols)) {
        if (is.character(patients_full[[col]])) {
            counts <- patients_full %>%
            count(!!sym(col), sort = TRUE)

        mdpre(paste("Counts for", col, ":"))
        mdpre(counts)
        }
    }
}
```

```
[1] "Counts for CITY :"
# A tibble: 29 × 2
   CITY           n
   <chr>      <int>
 1 Boston       541
 2 Quincy        80
 3 Cambridge     45
 4 Revere        42
 5 Chelsea       39
 6 Weymouth      37
 7 Somerville    25
 8 Hingham       22
 9 Winthrop      22
10 Brookline     17
#  19 more rows
```

```
[1] "Counts for STATE :"
# A tibble: 1 × 2
  STATE             n
  <chr>         <int>
1 Massachusetts   974
[1] "Counts for MARITAL :"
# A tibble: 5 × 2
  MARITAL     n
  <chr>   <int>
1 M         782
2 S         189
3 Fine        1
4 male        1
5 NA          1
[1] "Counts for RACE :"
# A tibble: 7 × 2
  RACE         n
  <chr>    <int>
1 white      680
2 black      163
3 asian       90
4 other       16
5 hawaiian    13
6 native      11
7 asiann       1
[1] "Counts for ETHNICITY :"
# A tibble: 4 × 2
  ETHNICITY       n
  <chr>       <int>
1 nonhispanic   781
2 hispanic      190
3 nonhispani      2
4 hispani         1
[1] "Counts for GENDER :"
# A tibble: 5 × 2
  GENDER     n
  <chr>  <int>
1 M        493
2 F        478
3 Female     1
4 Male       1
5 female     1
```

1.3.6 Question 10

If you see any weird values, get rid of the ones that don't make sense, and combine the ones that are formatted wrong. Don't forget ot check the dates! Print the new tables for categorical values, and print the date ranges.

[7]:
```r
# Marital
patients_full<- patients_full %>%
    mutate(MARITAL = ifelse(MARITAL %in% c("M", "S"), MARITAL, NA))

#Race
patients_full <- patients_full %>%
    mutate(RACE = ifelse(RACE == "asiann", "asian", RACE))

#Ethnicity
patients_full <- patients_full %>%
    mutate(ETHNICITY = case_when(
        ETHNICITY %in% c( "nonhispanic", "nonhispani") ~ "nonhispanic",
        ETHNICITY %in% c("hispanic", "hispani") ~ "hispanic",
        TRUE ~ ETHNICITY
    ))

#Gender
patients_full <- patients_full %>%
    mutate(GENDER = case_when(
        GENDER %in% c("F", "Female", "female") ~ "F",
        GENDER %in% c("M", "Male") ~ "M",
        TRUE ~ GENDER
    ))
# New Tables
exclude_cols <- c("ID", "FIRST", "LAST")

for(col in colnames(patients_full)) {
    if(!(col %in% exclude_cols)) {
        if (is.character(patients_full[[col]])) {
            counts <- patients_full %>%
            count(!!sym(col), sort = TRUE)

        mdpre(paste("Counts for", col, ":"))
        mdpre(counts)
        }
    }
}
#Dates
range(patients_full$BIRTHDATE, na.rm = TRUE)
range(patients_full$DEATHDATE, na.rm = TRUE)
```

```
[1] "Counts for CITY :"
# A tibble: 29 × 2
   CITY           n
   <chr>      <int>
 1 Boston       541
 2 Quincy        80
```

```
 3 Cambridge     45
 4 Revere        42
 5 Chelsea       39
 6 Weymouth      37
 7 Somerville    25
 8 Hingham       22
 9 Winthrop      22
10 Brookline     17
#  19 more rows
[1] "Counts for STATE :"
# A tibble: 1 × 2
  STATE             n
  <chr>         <int>
1 Massachusetts   974
[1] "Counts for MARITAL :"
# A tibble: 3 × 2
  MARITAL     n
  <chr>   <int>
1 M         782
2 S         189
3 NA          3
[1] "Counts for RACE :"
# A tibble: 6 × 2
  RACE         n
  <chr>    <int>
1 white      680
2 black      163
3 asian       91
4 other       16
5 hawaiian    13
6 native      11
[1] "Counts for ETHNICITY :"
# A tibble: 2 × 2
  ETHNICITY       n
  <chr>       <int>
1 nonhispanic   783
2 hispanic      191
[1] "Counts for GENDER :"
# A tibble: 2 × 2
  GENDER     n
  <chr>  <int>
1 M        494
2 F        480
```

1. 1969-01-11 2. 2068-10-08

1. 2011-02-03 2. 2022-01-27

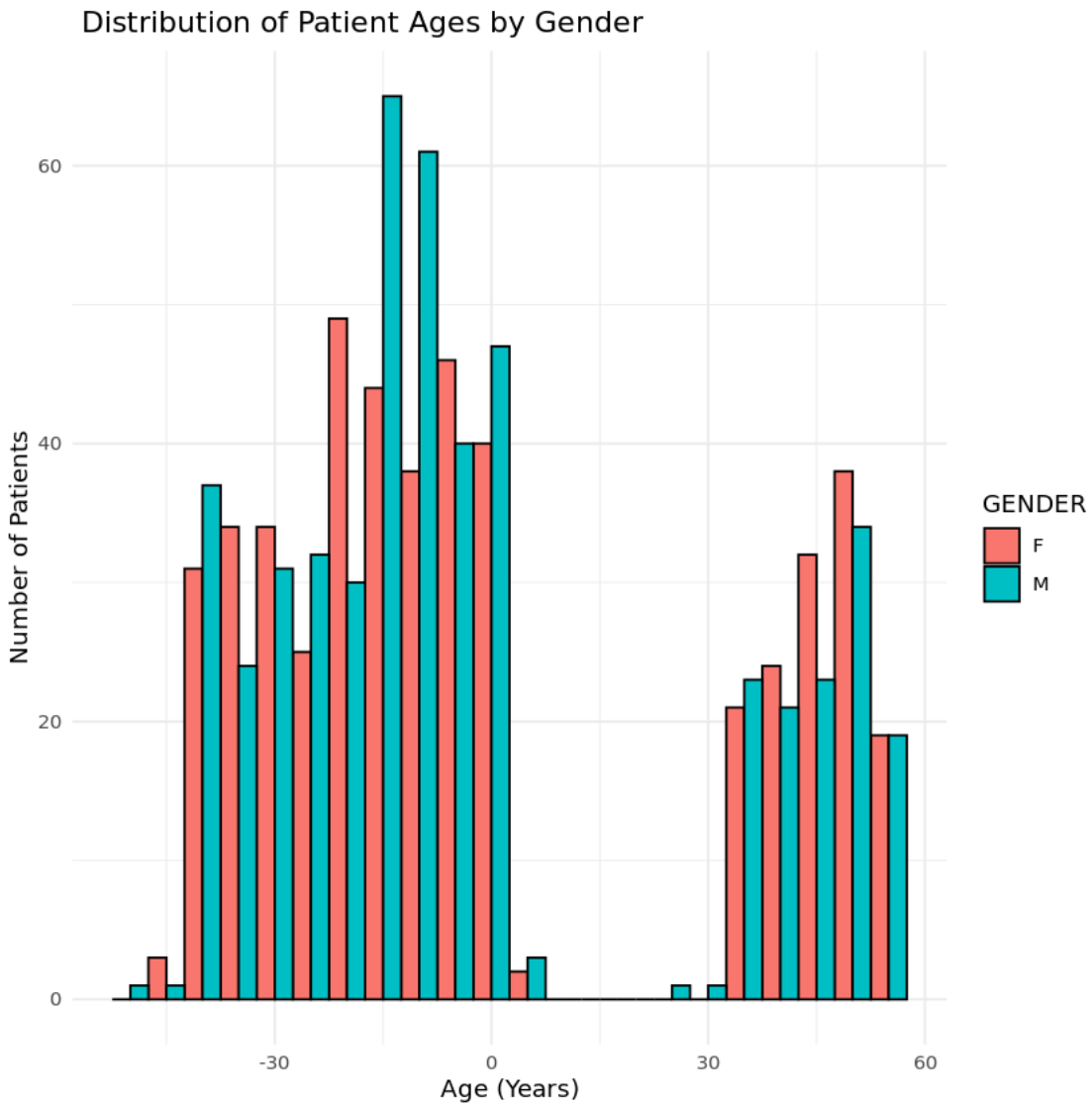
1.3.7 Question 11

Make a histogram of the ages of patients by gender.

[8]:
```
library(lubridate)
patients_full <- patients_full %>%
    mutate(
        AGE = ifelse(
            is.na(DEATHDATE),
            as.integer(interval(BIRTHDATE, Sys.Date()) / years(1)),
            as.integer(interval(BIRTHDATE, DEATHDATE) / years(1))

        )
    )

ggplot(patients_full, aes(x=AGE, fill = GENDER)) +
    geom_histogram(binwidth = 5, position = "dodge", color = "black") +
    labs(
        title = " Distribution of Patient Ages by Gender",
        x = "Age (Years)",
        y = "Number of Patients"
    ) +
theme_minimal()
```



1.3.8 Question 12

Make a scatterplot of birthdate by martial status.

[19]:
```
patients_full <- patients_full %>%
  mutate(
    AGE = ifelse(
      is.na(DEATHDATE),
      as.numeric(difftime(Sys.Date(), BIRTHDATE, units = "days")) / 365.25,
      as.numeric(difftime(DEATHDATE, BIRTHDATE, units = "days")) / 365.25
    )
  )
patients_clean <- patients_full %>%
```

```
    filter(AGE >= 0 & AGE<= 120)
ggplot(patients_clean, aes(x = AGE, y = MARITAL, color = MARITAL)) +
  geom_jitter(alpha = 0.6, width = 100, height = 0.3) +
  labs(
    title = "Scatterplot of Patient Age by Marital Status",
    x = "Birthdate",
    y = "Marital Status"
  )
theme_minimal()
```

```
List of 97
 $ line                        :List of 6
  ..$ colour       : chr "black"
  ..$ linewidth    : num 0.5
  ..$ linetype     : num 1
  ..$ lineend      : chr "butt"
  ..$ arrow        : logi FALSE
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_line" "element"
 $ rect                        :List of 5
  ..$ fill         : chr "white"
  ..$ colour       : chr "black"
  ..$ linewidth    : num 0.5
  ..$ linetype     : num 1
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_rect" "element"
 $ text                        :List of 11
  ..$ family       : chr ""
  ..$ face         : chr "plain"
  ..$ colour       : chr "black"
  ..$ size         : num 11
  ..$ hjust        : num 0.5
  ..$ vjust        : num 0.5
  ..$ angle        : num 0
  ..$ lineheight   : num 0.9
  ..$ margin       : 'margin' num [1:4] 0points 0points 0points 0points
  .. ..- attr(*, "unit")= int 8
  ..$ debug        : logi FALSE
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
 $ title                       : NULL
 $ aspect.ratio                : NULL
 $ axis.title                  : NULL
 $ axis.title.x                :List of 11
  ..$ family       : NULL
  ..$ face         : NULL
  ..$ colour       : NULL
```

```
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 1
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 2.75points 0points 0points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.title.x.top          :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 0
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 0points 2.75points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.title.x.bottom       : NULL
$ axis.title.y              :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 1
 ..$ angle        : num 90
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 2.75points 0points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.title.y.left         : NULL
$ axis.title.y.right        :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 0
 ..$ angle        : num -90
```

```
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 0points 0points 2.75points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text                 :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : chr "grey30"
 ..$ size         : 'rel' num 0.8
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text.x               :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 1
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 2.2points 0points 0points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text.x.top           :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : num 0
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 0points 2.2points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text.x.bottom        : NULL
```

```
$ axis.text.y               :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : num 1
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 2.2points 0points 0points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text.y.left          : NULL
$ axis.text.y.right         :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : num 0
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 0points 0points 0points 2.2points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.ticks                : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ axis.ticks.x              : NULL
$ axis.ticks.x.top          : NULL
$ axis.ticks.x.bottom       : NULL
$ axis.ticks.y              : NULL
$ axis.ticks.y.left         : NULL
$ axis.ticks.y.right        : NULL
$ axis.ticks.length         : 'simpleUnit' num 2.75points
 ..- attr(*, "unit")= int 8
$ axis.ticks.length.x       : NULL
$ axis.ticks.length.x.top   : NULL
$ axis.ticks.length.x.bottom: NULL
$ axis.ticks.length.y       : NULL
$ axis.ticks.length.y.left  : NULL
$ axis.ticks.length.y.right : NULL
$ axis.line                 : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ axis.line.x               : NULL
```

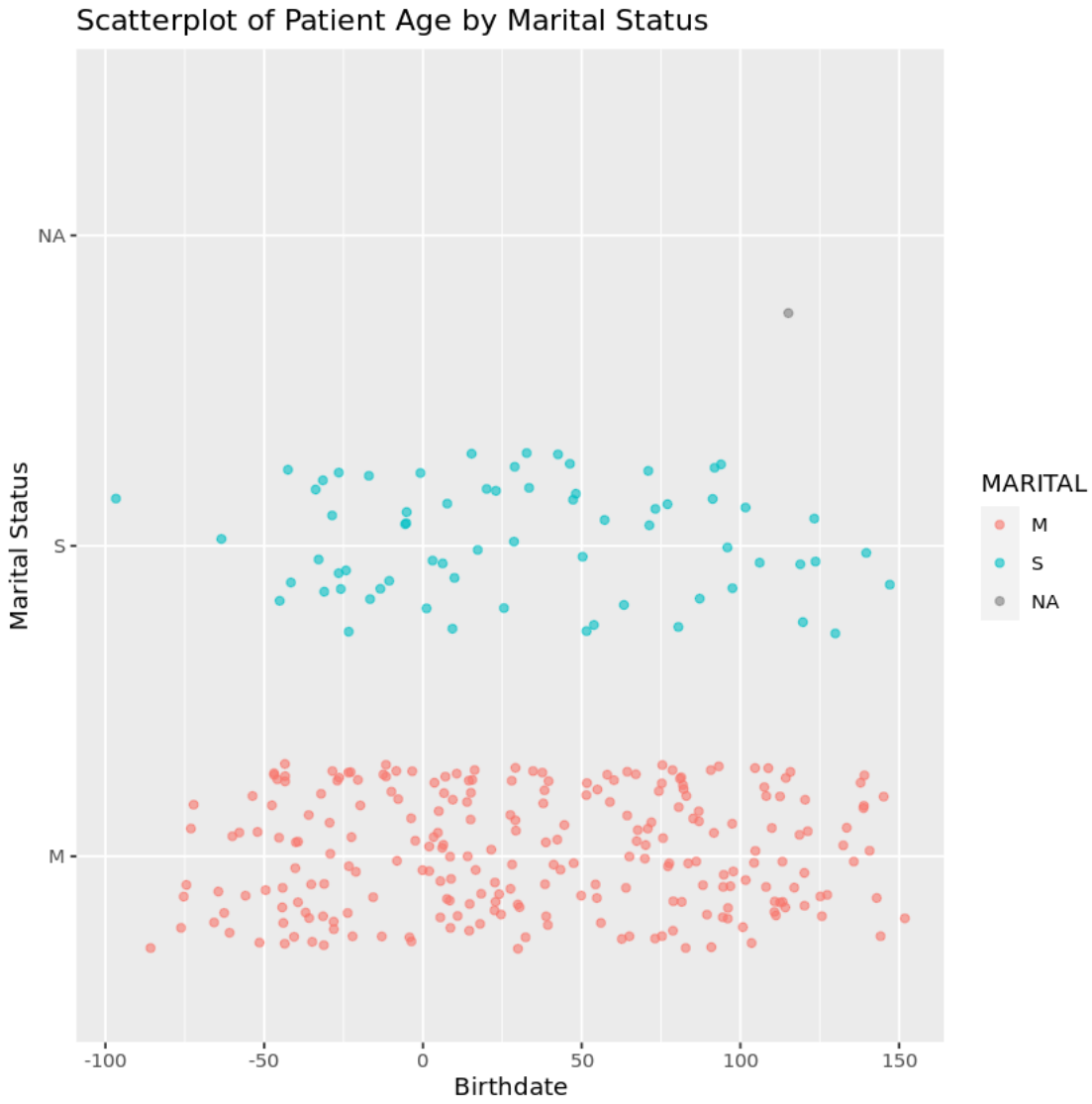
```
$ axis.line.x.top           : NULL
$ axis.line.x.bottom        : NULL
$ axis.line.y               : NULL
$ axis.line.y.left          : NULL
$ axis.line.y.right         : NULL
$ legend.background         : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ legend.margin             : 'margin' num [1:4] 5.5points 5.5points 5.5points␣
↪5.5points
 ..- attr(*, "unit")= int 8
$ legend.spacing            : 'simpleUnit' num 11points
 ..- attr(*, "unit")= int 8
$ legend.spacing.x          : NULL
$ legend.spacing.y          : NULL
$ legend.key                : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ legend.key.size           : 'simpleUnit' num 1.2lines
 ..- attr(*, "unit")= int 3
$ legend.key.height         : NULL
$ legend.key.width          : NULL
$ legend.text               :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : 'rel' num 0.8
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ legend.text.align         : NULL
$ legend.title              :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : num 0
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
```

```
$ legend.title.align        : NULL
$ legend.position           : chr "right"
$ legend.direction          : NULL
$ legend.justification      : chr "center"
$ legend.box                : NULL
$ legend.box.just           : NULL
$ legend.box.margin         : 'margin' num [1:4] 0cm 0cm 0cm 0cm
 ..- attr(*, "unit")= int 1
$ legend.box.background     : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ legend.box.spacing        : 'simpleUnit' num 11points
 ..- attr(*, "unit")= int 8
$ panel.background          : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ panel.border              : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ panel.spacing             : 'simpleUnit' num 5.5points
 ..- attr(*, "unit")= int 8
$ panel.spacing.x           : NULL
$ panel.spacing.y           : NULL
$ panel.grid                :List of 6
 ..$ colour       : chr "grey92"
 ..$ linewidth    : NULL
 ..$ linetype     : NULL
 ..$ lineend      : NULL
 ..$ arrow        : logi FALSE
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_line" "element"
$ panel.grid.major          : NULL
$ panel.grid.minor          :List of 6
 ..$ colour       : NULL
 ..$ linewidth    : 'rel' num 0.5
 ..$ linetype     : NULL
 ..$ lineend      : NULL
 ..$ arrow        : logi FALSE
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_line" "element"
$ panel.grid.major.x        : NULL
$ panel.grid.major.y        : NULL
$ panel.grid.minor.x        : NULL
$ panel.grid.minor.y        : NULL
$ panel.ontop               : logi FALSE
$ plot.background           : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ plot.title                :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
```

```
  ..$ size         : 'rel' num 1.2
  ..$ hjust        : num 0
  ..$ vjust        : num 1
  ..$ angle        : NULL
  ..$ lineheight   : NULL
  ..$ margin       : 'margin' num [1:4] 0points 0points 5.5points 0points
  .. ..- attr(*, "unit")= int 8
  ..$ debug        : NULL
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ plot.title.position       : chr "panel"
$ plot.subtitle             :List of 11
  ..$ family       : NULL
  ..$ face         : NULL
  ..$ colour       : NULL
  ..$ size         : NULL
  ..$ hjust        : num 0
  ..$ vjust        : num 1
  ..$ angle        : NULL
  ..$ lineheight   : NULL
  ..$ margin       : 'margin' num [1:4] 0points 0points 5.5points 0points
  .. ..- attr(*, "unit")= int 8
  ..$ debug        : NULL
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ plot.caption              :List of 11
  ..$ family       : NULL
  ..$ face         : NULL
  ..$ colour       : NULL
  ..$ size         : 'rel' num 0.8
  ..$ hjust        : num 1
  ..$ vjust        : num 1
  ..$ angle        : NULL
  ..$ lineheight   : NULL
  ..$ margin       : 'margin' num [1:4] 5.5points 0points 0points 0points
  .. ..- attr(*, "unit")= int 8
  ..$ debug        : NULL
  ..$ inherit.blank: logi TRUE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ plot.caption.position     : chr "panel"
$ plot.tag                  :List of 11
  ..$ family       : NULL
  ..$ face         : NULL
  ..$ colour       : NULL
  ..$ size         : 'rel' num 1.2
  ..$ hjust        : num 0.5
  ..$ vjust        : num 0.5
  ..$ angle        : NULL
```

```
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ plot.tag.position         : chr "topleft"
$ plot.margin               : 'margin' num [1:4] 5.5points 5.5points 5.5points␣
↪5.5points
 ..- attr(*, "unit")= int 8
$ strip.background          : list()
 ..- attr(*, "class")= chr [1:2] "element_blank" "element"
$ strip.background.x        : NULL
$ strip.background.y        : NULL
$ strip.clip                : chr "inherit"
$ strip.placement           : chr "inside"
$ strip.text                :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : chr "grey10"
 ..$ size         : 'rel' num 0.8
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
 .. ..- attr(*, "unit")= int 8
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ strip.text.x              : NULL
$ strip.text.x.bottom       : NULL
$ strip.text.x.top          : NULL
$ strip.text.y              :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : num -90
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ strip.text.y.left         :List of 11
 ..$ family       : NULL
```

```
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : NULL
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : num 90
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi TRUE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ strip.text.y.right        : NULL
$ strip.switch.pad.grid     : 'simpleUnit' num 2.75points
 ..- attr(*, "unit")= int 8
$ strip.switch.pad.wrap     : 'simpleUnit' num 2.75points
 ..- attr(*, "unit")= int 8
- attr(*, "class")= chr [1:2] "theme" "gg"
- attr(*, "complete")= logi TRUE
- attr(*, "validate")= logi TRUE
```


Scatterplot of Patient Age by Marital Status
Marital Status
NA
S
M
-100
-50
0
50
100
150
Birthdate
MARITAL
M
S
NA

[ ]: