Day 3

Running R from the command line

(Very rough) time plan

Friday Nov 15

13:15-14:00

- Introduction to R and RStudio
- Set up and get going
- Do Exercise 1

14:15 - 16:00

- Go through Exercise 1
- R packages and the Tidyverse
- Rectangular and tidy data
- Working with files
- Exercise 2
- Go through Exercise 2

Thursday Nov 21

09:15 - 10:45

- Manipulating data with dplyr
- Exercise 3
- Go through Exercise 3

11:00 - 12:00

- Basic plotting
- Exercise 4
- Go through exercise 4 together

13:15 - 16:00

- Programming basics
  - For loops + Ex 5 (13:00 - 14:15)
  - Ex 5 + If statements + Ex 6 (14:30 - 15:30)
  - Go through exercise 6 (15:45 - 16:15)
- Wrap-up

Friday Nov 22

09:15 – 12:00

- R scripts
  - Running R on the command line
  - Command line arguments
- Plotting with ggplot2 (not curriculum – brief demo + exercise)

R scripts

The first thing we'll do is to log on to Fox cloud and enter your home directory.

From there type:

module load R/4.2.1-foss-2022a

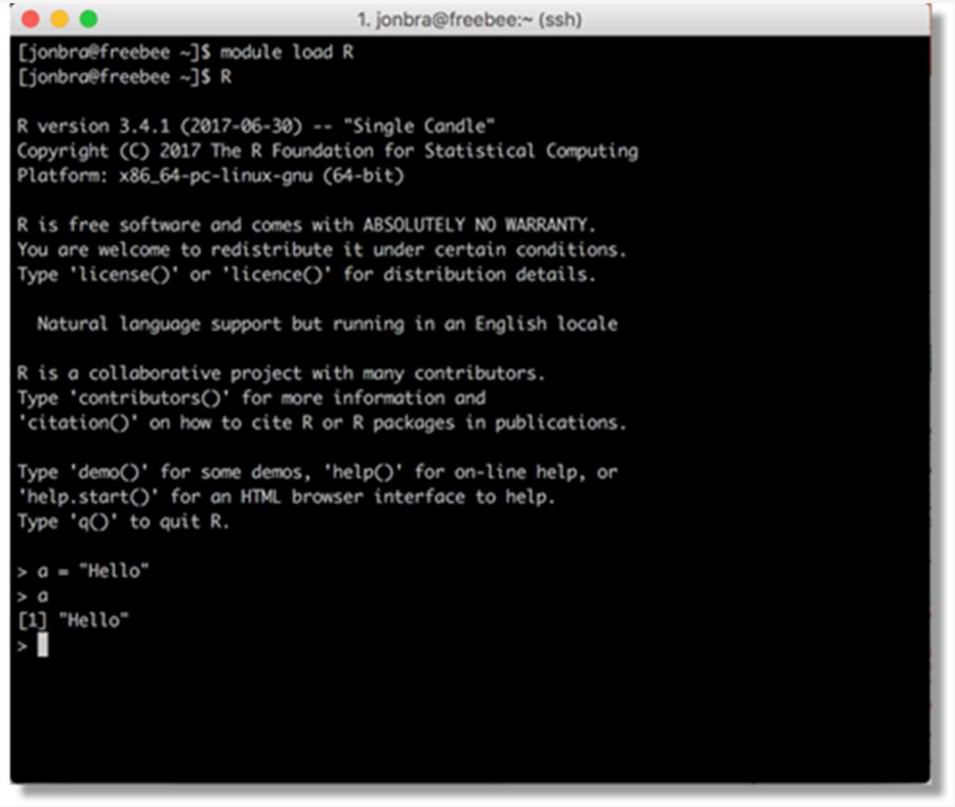
Then start R by typing "*R*" and "Enter".

You should see something similar to the image. This is an interactive R session.

Activate tidyverse by typing

library(tidyverse)

Close R by typing *quit()*, and don't save the workspace or anything.



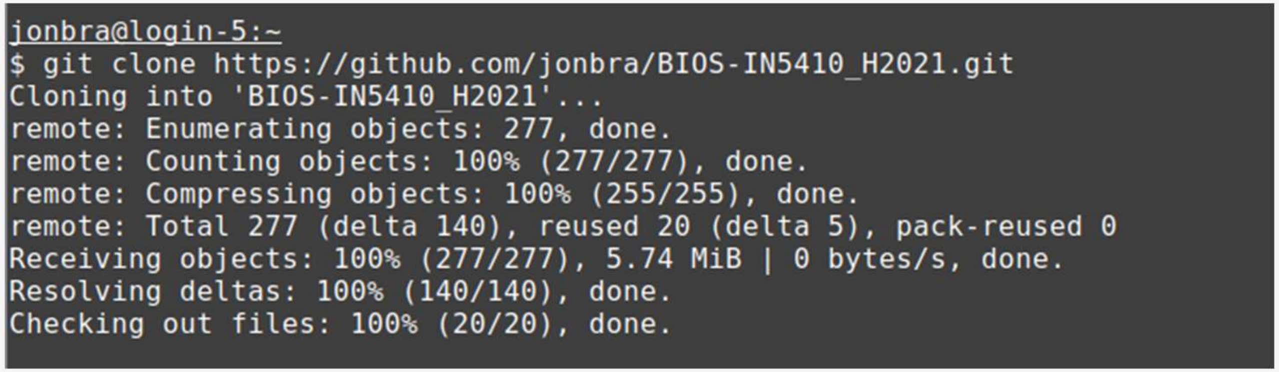
```
[jonbra@freebee ~]$ module load R
[jonbra@freebee ~]$ R

R version 3.4.1 (2017-06-30) -- "Single Candle"
Copyright (C) 2017 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

  Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> a = "Hello"
> a
[1] "Hello"
> 
```

R scripts

Then clone the BIOS-IN5410 GitHub repo (either my repo or your own copy if you’ve created one) to your home directory (or somwhere else if you prefer) by first typing *cd* and *Enter*, and then:

git clone https://github.com/jonbra/BIOS-IN5410_H2021.git

(NB: use the https link).



```
jonbra@login-5:~
$ git clone https://github.com/jonbra/BIOS-IN5410_H2021.git
Cloning into 'BIOS-IN5410_H2021'...
remote: Enumerating objects: 277, done.
remote: Counting objects: 100% (277/277), done.
remote: Compressing objects: 100% (255/255), done.
remote: Total 277 (delta 140), reused 20 (delta 5), pack-reused 0
Receiving objects: 100% (277/277), 5.74 MiB | 0 bytes/s, done.
Resolving deltas: 100% (140/140), done.
Checking out files: 100% (20/20), done.
```

Exercise 7

Log on to Saga and do Exercise 7.

You can try it yourself, but I will go through each part separately and explain what is going on.

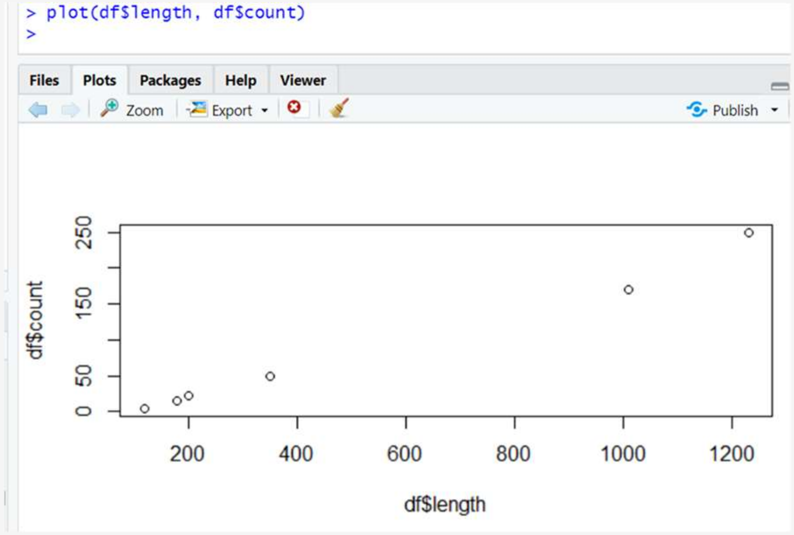
Plotting with ggplot2

Plotting with ggplot2

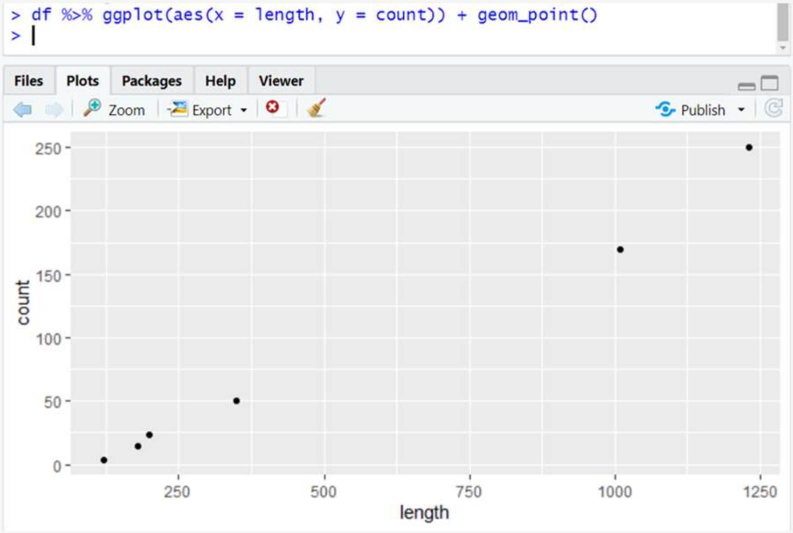
On Friday you made some simple plots with base R plotting functions.

You can make great plots with base R, don’t worry. But there’s a very popular package for plotting in R, ggplot2, that is very useful to know about.

ggplot2 is automatically activated when you load Tidyverse, and it’s particularly suited to operate on tidy data.



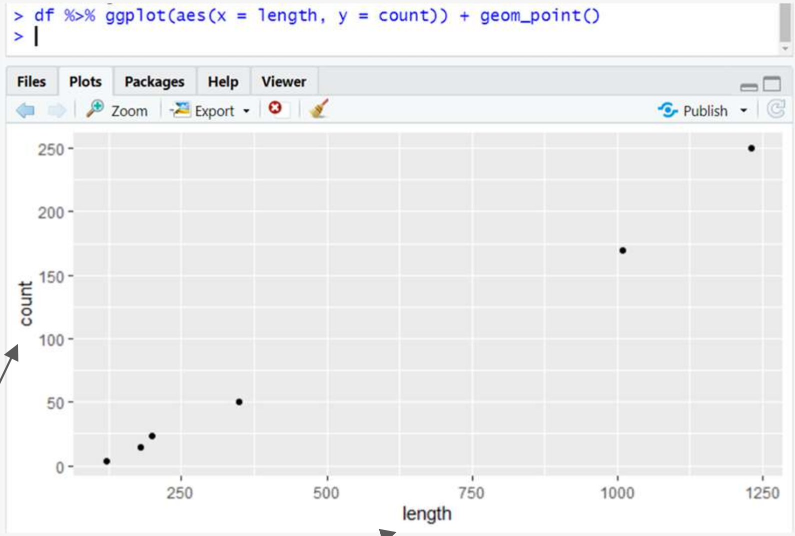
```
> plot(df$length, df$count)
>
```



```
> df %>% ggplot(aes(x = length, y = count)) + geom_point()
>
```

Plotting with ggplot2

```
> df
# A tibble: 6 x 3
  Gene  count length
  <chr> <dbl>  <dbl>
1 A         4    120
2 B        50    350
3 C        23    200
4 D       250   1230
5 E        15    180
6 F       170   1010


> df %>%
    ggplot(aes(x = length, y = count)) +
    geom_point()
```



```
> df %>% ggplot(aes(x = length, y = count)) + geom_point()
> |
```

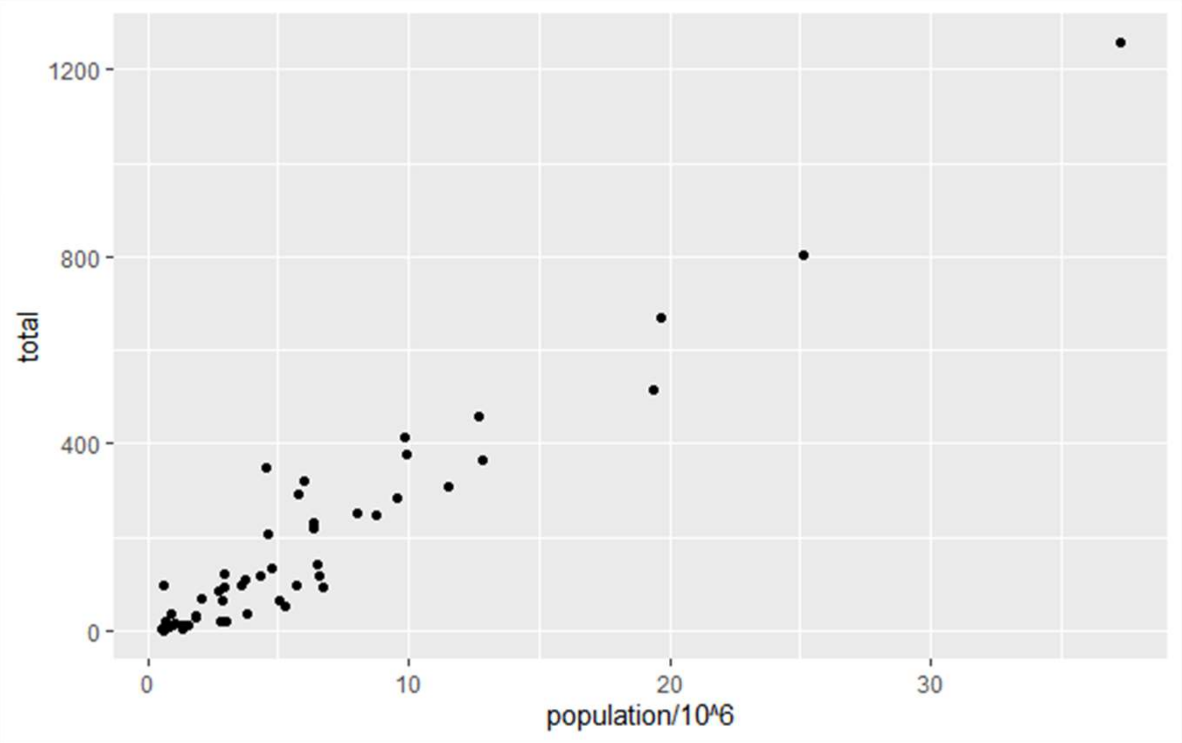
Plots are initiated with the function **ggplot()**. Then the different subfunctions are tied together in layers using the “+” symbol (like a “pipe”).

Aesthetics (aes) is a mapping of the variables in the data the different properties of the plot (the geom), like x and y axes, color, etc.

Plotting with ggplot2

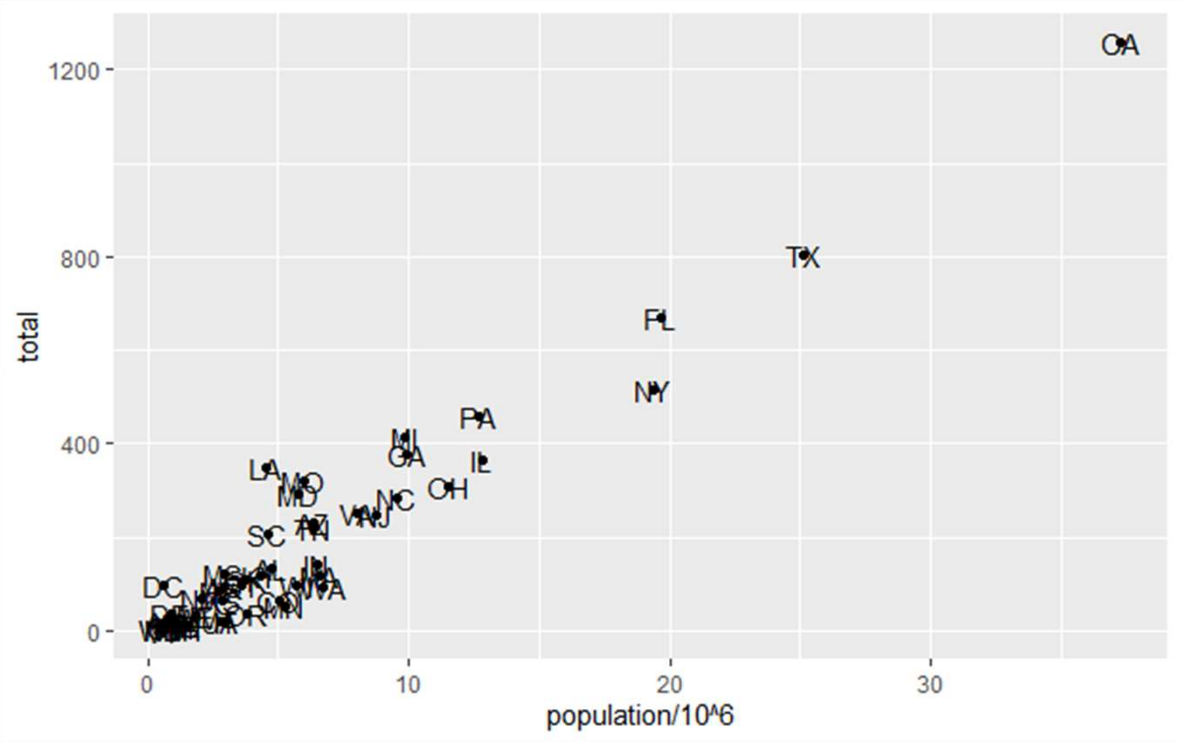
A quick demonstration of how ggplot2 plots are built up by adding layers

```
murders %>% ggplot() +
  geom_point(aes(x =
population/10^6, y = total))
```



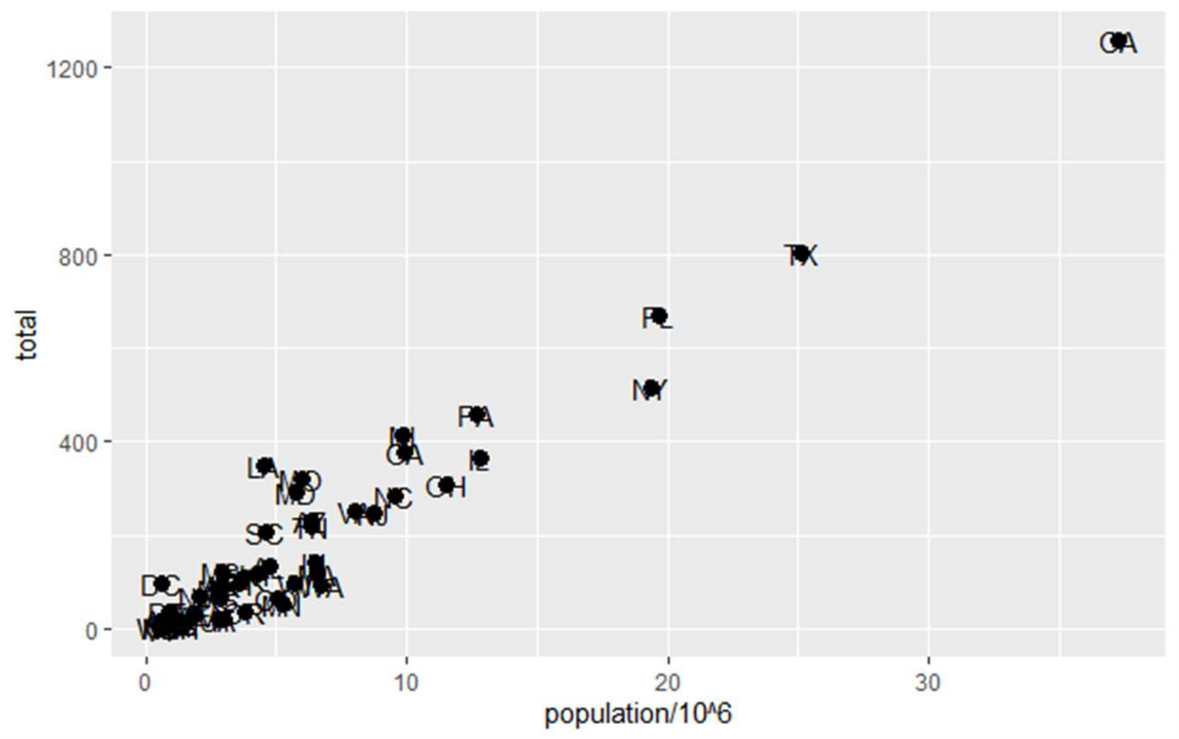
Plotting with ggplot2

```
murders %>% ggplot() +
  geom_point(aes(x =
population/10^6, y = total)) +
  geom_text(aes(population/10^6,
total, label = abb))
```



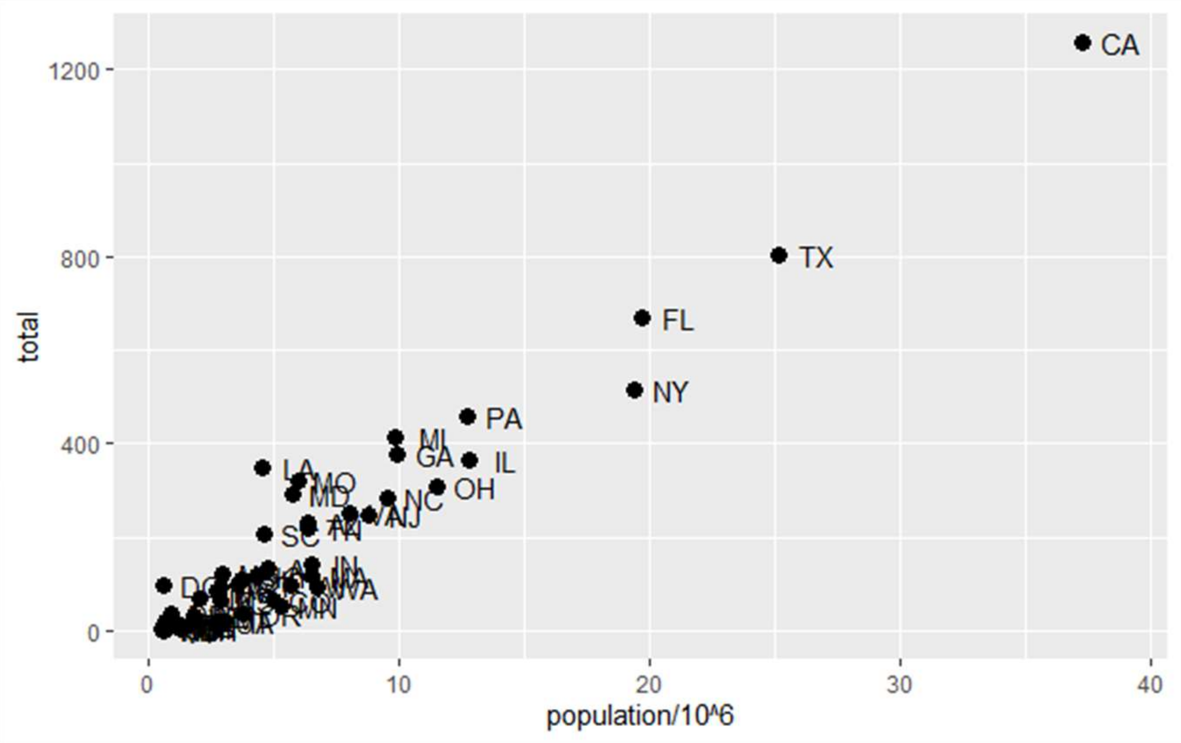
Plotting with ggplot2

```
murders %>% ggplot() +
  geom_point(aes(x =
population/10^6, y = total), size
= 3) +
  geom_text(aes(population/10^6,
total, label = abb))
```



Plotting with ggplot2

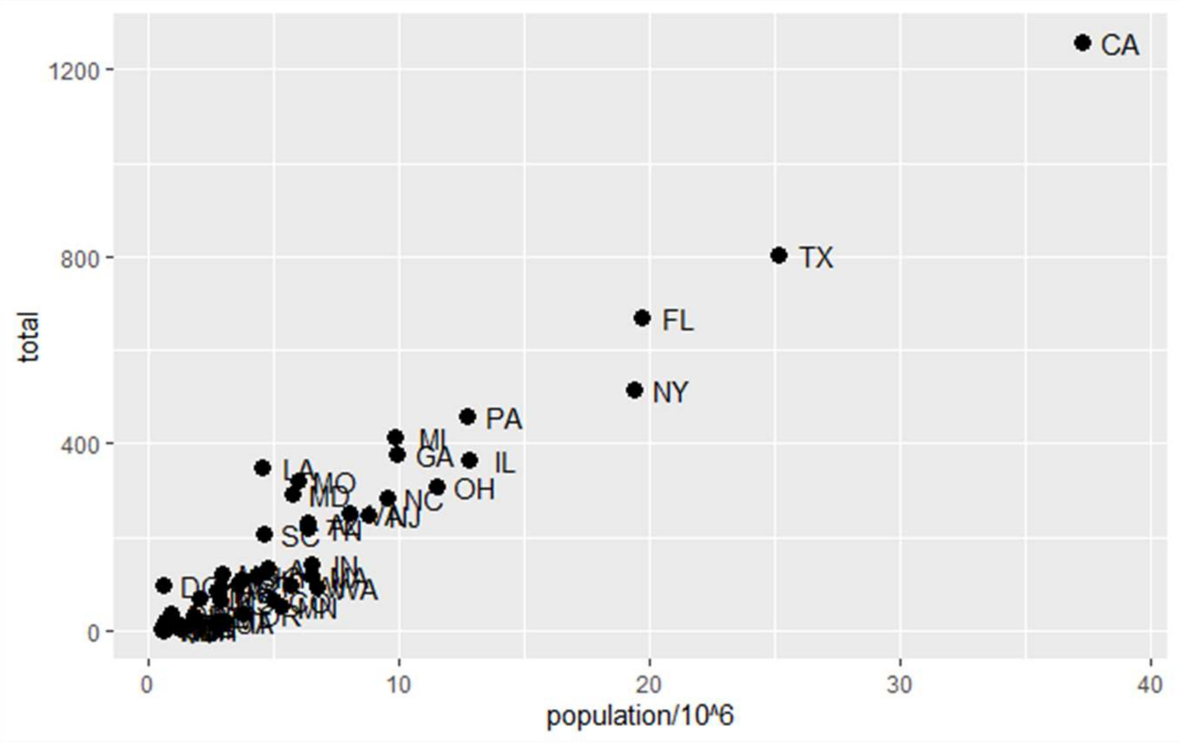
```
murders %>% ggplot() +
  geom_point(aes(x =
population/10^6, y = total), size
= 3) +
     geom_text(aes(population/10^
6, total, label = abb), nudge_x =
1.5)
```



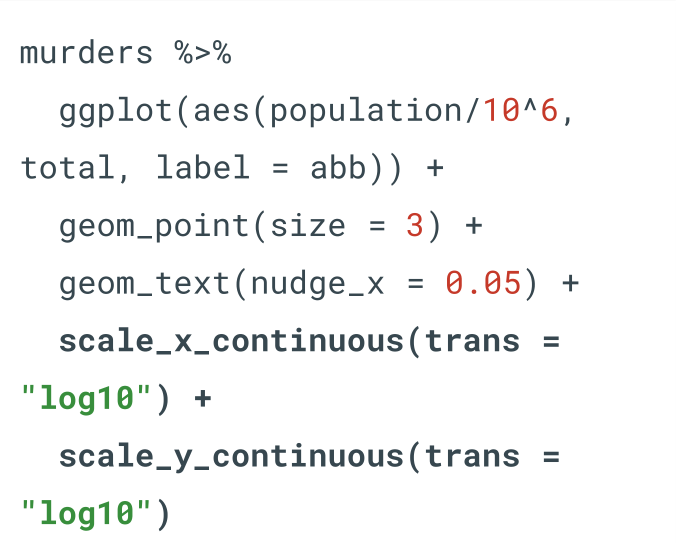
Plotting with ggplot2

Global aesthetics. Apply to all layers

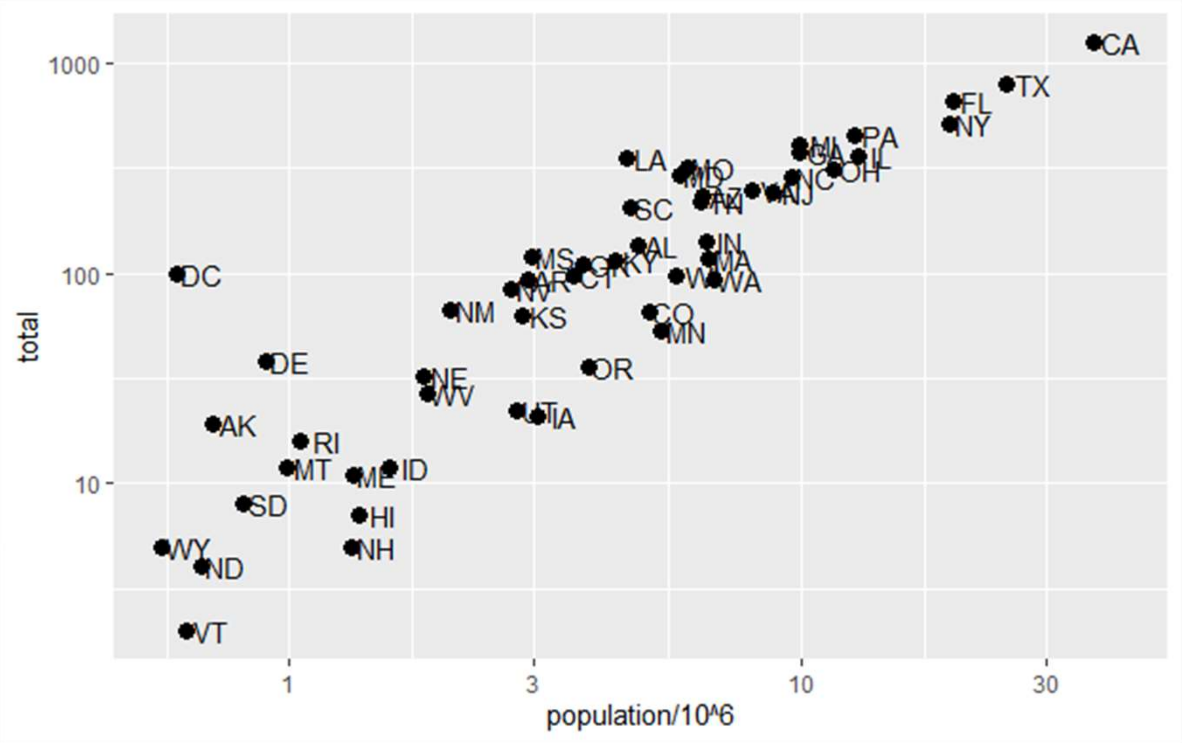
```
murders %>%
  ggplot(aes(population/10^6,
total, label = abb)) +
  geom_point(size = 3) +
  geom_text(nudge_x = 1.5)
```



Plotting with ggplot2

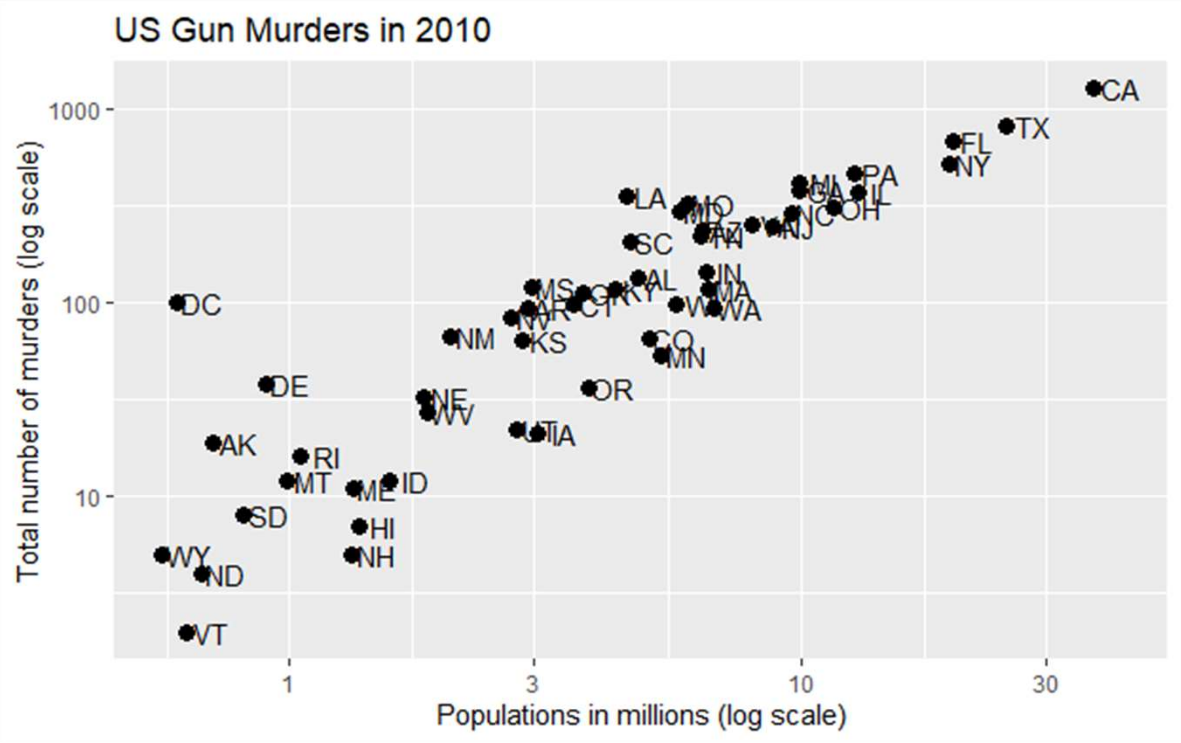


```
murders %>%
  ggplot(aes(population/10^6,
total, label = abb)) +
  geom_point(size = 3) +
  geom_text(nudge_x = 0.05) +
  scale_x_continuous(trans =
"log10") +
  scale_y_continuous(trans =
"log10")
```

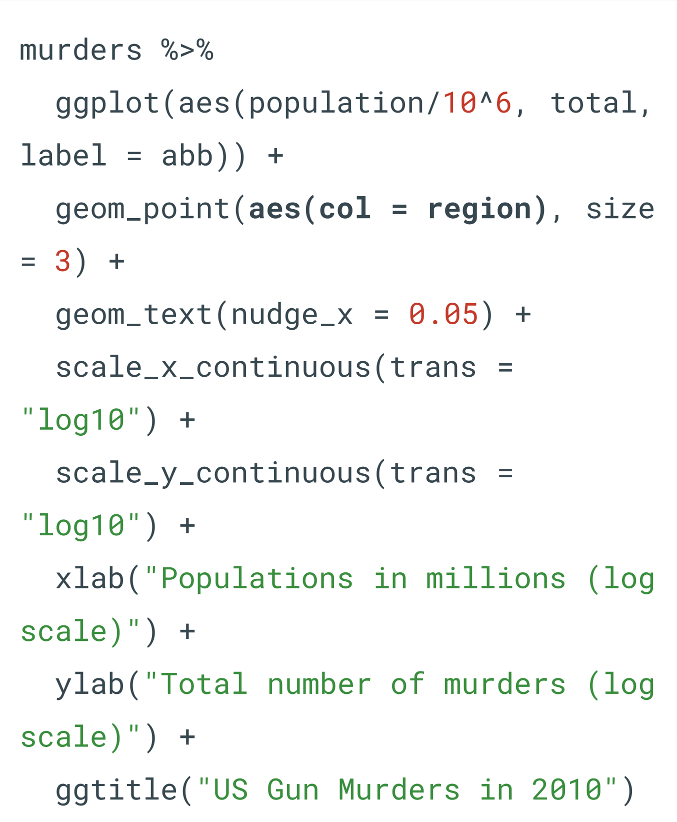


Plotting with ggplot2

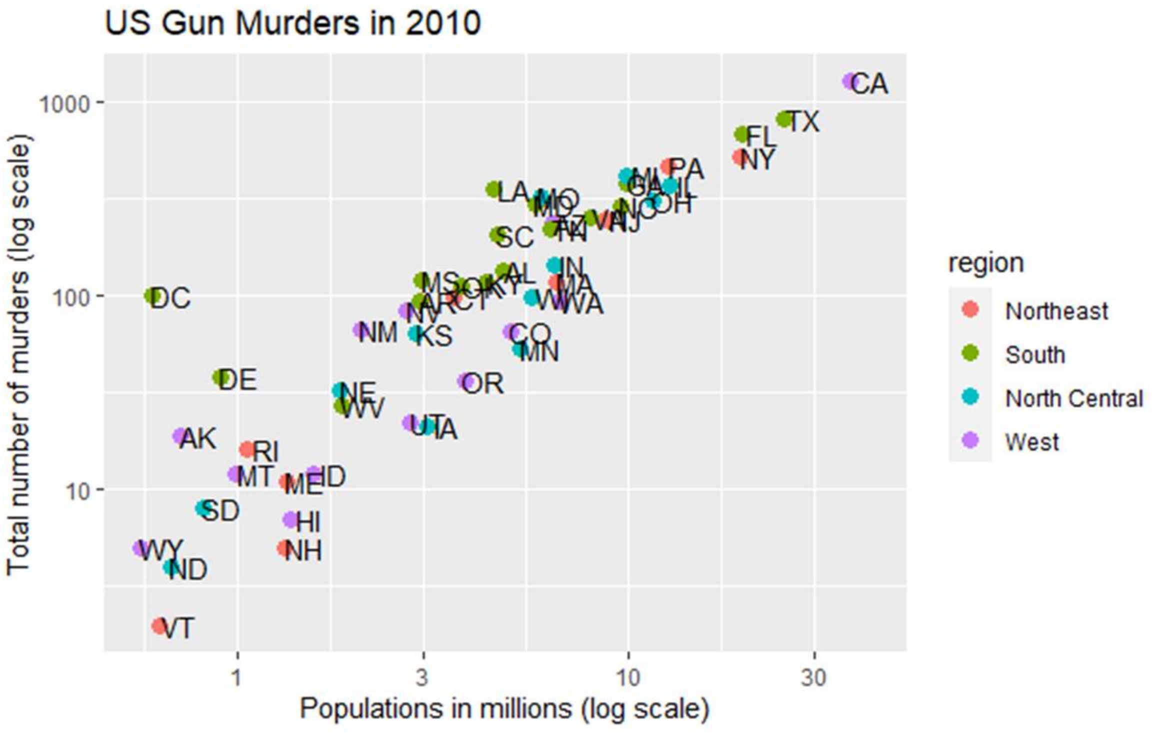
```
murders %>%
  ggplot(aes(population/10^6,
total, label = abb)) +
  geom_point(size = 3) +
  geom_text(nudge_x = 0.05) +
  scale_x_continuous(trans =
"log10") +
  scale_y_continuous(trans =
"log10") +
  xlab("Populations in millions
(log scale)") +
  ylab("Total number of murders
(log scale)") +
  ggtitle("US Gun Murders in
2010")
```



Plotting with ggplot2



```
murders %>%
  ggplot(aes(population/10^6, total,
label = abb)) +
  geom_point(aes(col = region), size
= 3) +
  geom_text(nudge_x = 0.05) +
  scale_x_continuous(trans =
"log10") +
  scale_y_continuous(trans =
"log10") +
  xlab("Populations in millions (log
scale)") +
  ylab("Total number of murders (log
scale)") +
  ggtitle("US Gun Murders in 2010")
```



Do Exercise 8