

# ProblemSet2Skills

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```
library(ggplot2)
library(dslabs)
```

```
## Warning: package 'dslabs' was built under R version 4.0.4
```

```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.0 --
```

```
## v tibble  3.0.4      v dplyr    1.0.2
## v tidyr   1.1.2      v stringr 1.4.0
## v readr   1.4.0      v forcats 0.5.0
## v purrr   0.3.4
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
```

```
library(dplyr)
library(tinytex)
```

## 1 Git Concepts

1 List 4 benefits git is a software for distributed version control. List 4 benefits of distributed version control -good way to cooperate with others especially when many are working on code or projects -good way to be able to reinstate old versions -good way to back up work -good way to keep track of big projects and to make sure everybody is using the same version

- i. What is the remote repository for this homework? The remote repository for this homework the common class repository which we use to exchange any changes to our R Studio files. The remote repository is stored in GitHub Desktop. It is called datasci-harris/git-github-basics(studentname). Each student has their own private repository.
- ii. How do you add a file to staging in github? You need to press Staged and then it will automatically become staged. Then you should press Commit and then push for it to go fully into github.
- iii. How do you commit an issue to the local repository? First you need to make sure you start a new project which has version control. Then you make sure that the file/project is connected to your repository before you start editing the file. You find the link for the file at GitHub Desktop. Then you go to File -> New Project -> Version Control -> Git and you paste the link. Then each time you need to go to Git -> staged -> commit. Then you also need to remember to select push to push the file to github.

- iv. How does github desktop decide what part of your code to show in the main part of the window? Github chooses the most up to date code to show at each time. It chooses the code I upload when I select Commit and Push.
- v. What branch are you on right now? Currently I have only one branch for this Problem Set which is the main branch.
- vi. If you were to click on “current branch”, type a name and click the “New Branch” button, you would create a new branch
  - a. What would happen to the files in your working directory? They may move between branches and there will be a new version of my code in the data. You must be careful to be in the correct branch at each time.
  - b. what would happens in the remote repo? There would be a new branch and it may be that the remote repository will now be able to find it.
  - c. what changes, if anything? There is an extra branch and the data could start floating around between two locations if we’re not careful
  - d. why would you want to work on a different branch? Perhaps it will help organize different projects and problem sets or keep two different versions of the data. it is good to use branches to safely experiment with projects with out destroying the original project

## 2.1 Debugging mindset 2.1.1

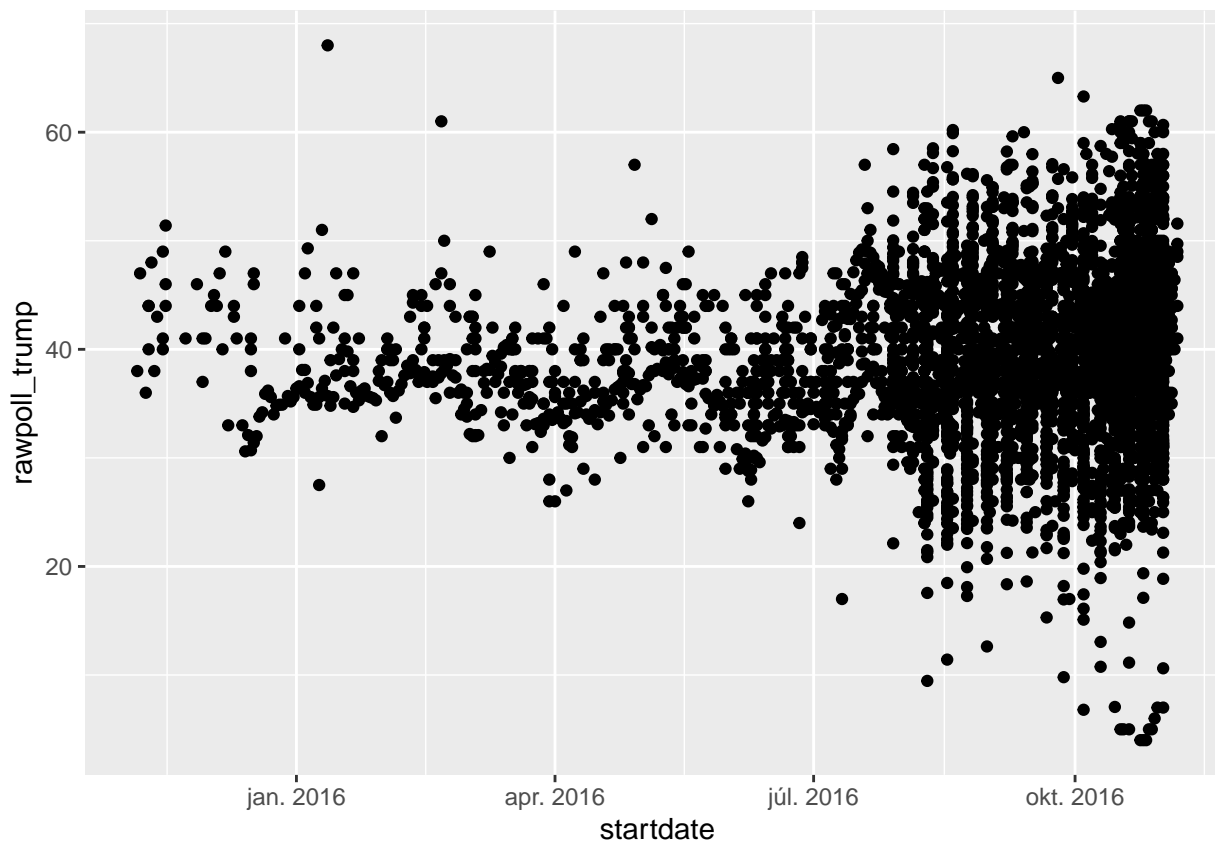
```
my_variable <- 10  
my_variable
```

```
## [1] 10
```

This code runs smoothly in my laptop. However, there may be an issue with running the second variable as it is not written in the same way as the first line of code.

## 2.1.2 Fix the following code so it works

```
library(dslabs)  
ggplot(data = polls_us_election_2016) +  
  geom_point(mapping = aes(x = startdate,  
                           y = rawpoll_trump))
```



```
filter(polls_us_election_2016, state == "Florida") %>% head()
```

```
##      state startdate   enddate      pollster grade samplesize
## 1 Florida 2016-11-03 2016-11-06 Quinnipiac University    A-      884
## 2 Florida 2016-11-01 2016-11-02 Remington    <NA>     2352
## 3 Florida 2016-11-02 2016-11-04 YouGov      B       1188
## 4 Florida 2016-10-20 2016-10-24 SurveyUSA    A       1251
## 5 Florida 2016-11-01 2016-11-07 SurveyMonkey  C-      4092
## 6 Florida 2016-10-27 2016-11-01 CNN/Opinion Research Corp. A-       773
##      population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1          lv          46          45          2          NA
## 2          lv          45          48          NA          NA
## 3          rv          45          45          NA          NA
## 4          lv          48          45          2          NA
## 5          lv          47          45          4          NA
## 6          lv          49          47          3          NA
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      46.44315      43.93999      2.098310      NA
## 2      44.85722      46.49677          NA      NA
## 3      47.07455      46.99468          NA      NA
## 4      46.74555      45.86589      1.520730      NA
## 5      45.59190      44.32744      1.692430      NA
## 6      48.35252      45.23579      2.469063      NA
```

```
filter(polls_us_election_2016, as.numeric(grade) > 3) %>% head()
```

```
##   state startdate   enddate
## 1 U.S. 2016-11-03 2016-11-06
## 2 U.S. 2016-11-01 2016-11-07
## 3 U.S. 2016-11-02 2016-11-06
## 4 U.S. 2016-11-04 2016-11-07
## 5 U.S. 2016-11-03 2016-11-06
## 6 U.S. 2016-11-03 2016-11-06
##
##               pollster grade samplesize
## 1             ABC News/Washington Post   A+      2220
## 2             Google Consumer Surveys    B      26574
## 3                   Ipsos      A-      2195
## 4                   YouGov      B      3677
## 5             Gravis Marketing      B-     16639
## 6 Fox News/Anderson Robbins Research/Shaw & Company Research    A      1295
##   population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1          lv          47.00          43.00          4.00          NA
## 2          lv          38.03          35.69          5.46          NA
## 3          lv          42.00          39.00          6.00          NA
## 4          lv          45.00          41.00          5.00          NA
## 5          rv          47.00          43.00          3.00          NA
## 6          lv          48.00          44.00          3.00          NA
##   adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      45.20163      41.72430      4.626221      NA
## 2      43.34557      41.21439      5.175792      NA
## 3      42.02638      38.81620      6.844734      NA
## 4      45.65676      40.92004      6.069454      NA
## 5      46.84089      42.33184      3.726098      NA
## 6      49.02208      43.95631      3.057876      NA
```

2.1.3. Press Alt (Option) + Shift + K. What happens? How can you get to the same place using the menus?

*#Alt (Option) + Shift + K shows us a preview of Keyboard Shortcut Quick References. In order to do this*

2.2 Filter 2.2.1. Using the polls\_us\_election\_2016 data frame in the ds\_labs package find the following  
2.2.1.1. Polls for the states of Hawaii and Alaska

```
filter(polls_us_election_2016, state == "Alaska" | state == "Hawaii") %>% head(10)
```

```
##   state startdate   enddate
## 1 Alaska 2016-11-03 2016-11-06
## 2 Hawaii 2016-11-01 2016-11-07
## 3 Alaska 2016-11-01 2016-11-07
## 4 Alaska 2016-10-25 2016-10-27
## 5 Alaska 2016-10-21 2016-10-26
## 6 Alaska 2016-10-11 2016-10-13
## 7 Alaska 2016-10-05 2016-10-06
## 8 Hawaii 2016-10-30 2016-11-06
## 9 Alaska 2016-10-30 2016-11-06
## 10 Hawaii 2016-10-04 2016-11-06
##
##               pollster grade samplesize
## 1             Gravis Marketing      B-      617
## 2             SurveyMonkey      C-      426
## 3             SurveyMonkey      C-      409
## 4             Google Consumer Surveys    B      446
## 5             Cracium Research    <NA>      400
## 6             Lake Research Partners    B+      500
## 7             Moore Information      B      500
## 8             SurveyMonkey      C-      426
## 9             SurveyMonkey      C-      382
## 10            YouGov      B      289
##   population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
```

```
## 1      rv      41.0      44.0      3.0      NA
## 2      lv      52.0      28.0      9.0      NA
## 3      lv      31.0      48.0     12.0      NA
## 4      lv      38.0      39.0     11.0      NA
## 5      lv      47.0      43.0      7.0      NA
## 6      lv      36.0      37.0      7.0      NA
## 7      lv      34.0      37.0     10.0      NA
## 8      lv      52.0      29.0      9.0      NA
## 9      lv      31.0      47.0     13.0      NA
## 10     lv      50.3      27.9      4.1      NA
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      40.84795      43.33498      3.726098      NA
## 2      50.61398      27.33769      6.692430      NA
## 3      29.60705      47.33447      9.692430      NA
## 4      43.43333      46.13872      9.828628      NA
## 5      44.75680      44.77065      6.616653      NA
## 6      36.93134      42.37487      5.751367      NA
## 7      36.22323      41.11790      8.260216      NA
## 8      50.68395      28.39450      6.677361      NA
## 9      29.67449      46.38923     10.677360      NA
## 10     51.16296      30.58176      3.811562      NA
```

2.2.1.2

```
filter(polls_us_election_2016, samplesize > 500) %>% head(10)
```

```
##      state startdate enddate
## 1      U.S. 2016-11-03 2016-11-06
## 2      U.S. 2016-11-01 2016-11-07
## 3      U.S. 2016-11-02 2016-11-06
## 4      U.S. 2016-11-04 2016-11-07
## 5      U.S. 2016-11-03 2016-11-06
## 6      U.S. 2016-11-03 2016-11-06
## 7      U.S. 2016-11-02 2016-11-06
## 8      U.S. 2016-11-03 2016-11-05
## 9 New Mexico 2016-11-06 2016-11-06
## 10     U.S. 2016-11-04 2016-11-07
##
##      pollster grade samplesize
## 1      ABC News/Washington Post      A+      2220
## 2      Google Consumer Surveys      B      26574
## 3      Ipsos      A-      2195
## 4      YouGov      B      3677
## 5      Gravis Marketing      B-      16639
## 6 Fox News/Anderson Robbins Research/Shaw & Company Research      A      1295
## 7      CBS News/New York Times      A-      1426
## 8      NBC News/Wall Street Journal      A-      1282
## 9      Zia Poll      <NA>      8439
## 10     IBD/TIPP      A-      1107
##      population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1      lv      47.00      43.00      4.00      NA
## 2      lv      38.03      35.69      5.46      NA
## 3      lv      42.00      39.00      6.00      NA
## 4      lv      45.00      41.00      5.00      NA
```

```
## 5      rv      47.00      43.00      3.00      NA
## 6      lv      48.00      44.00      3.00      NA
## 7      lv      45.00      41.00      5.00      NA
## 8      lv      44.00      40.00      6.00      NA
## 9      lv      46.00      44.00      6.00      NA
## 10     lv      41.20      42.70      7.10      NA
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      45.20163      41.72430      4.626221      NA
## 2      43.34557      41.21439      5.175792      NA
## 3      42.02638      38.81620      6.844734      NA
## 4      45.65676      40.92004      6.069454      NA
## 5      46.84089      42.33184      3.726098      NA
## 6      49.02208      43.95631      3.057876      NA
## 7      45.11649      40.92722      4.341786      NA
## 8      43.58576      40.77325      5.365788      NA
## 9      44.82594      41.59978      7.870127      NA
## 10     42.92745      42.23545      6.316175      NA
```

### 2.2.1.3

```
pdd <- filter(polls_us_election_2016, pollster == "YouGov" | pollster == "Google Consumer Surveys" | pollster == "ABC News/Washington Post" | pollster == "Elway Research")
head(pdd)
```

```
##      state startdate enddate      pollster grade samplesize
## 1      U.S. 2016-11-01 2016-11-07 Google Consumer Surveys      B      26574
## 2      U.S. 2016-11-04 2016-11-07      YouGov      B      3677
## 3      Ohio 2016-11-02 2016-11-04      YouGov      B      1189
## 4      Georgia 2016-11-03 2016-11-05      YouGov      B      995
## 5 Pennsylvania 2016-11-03 2016-11-05      YouGov      B      931
## 6      Florida 2016-11-02 2016-11-04      YouGov      B      1188
##      population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1      lv      38.03      35.69      5.46      NA
## 2      lv      45.00      41.00      5.00      NA
## 3      lv      45.00      46.00      NA      NA
## 4      lv      43.00      49.00      4.00      NA
## 5      lv      45.00      43.00      4.00      NA
## 6      rv      45.00      45.00      NA      NA
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      43.34557      41.21439      5.175792      NA
## 2      45.65676      40.92004      6.069454      NA
## 3      44.93624      45.09646      NA      NA
## 4      43.80799      48.99024      5.169494      NA
## 5      45.82043      42.99602      5.169494      NA
## 6      47.07455      46.99468      NA      NA
```

### 2.2.1.4

```
filter(polls_us_election_2016, as.numeric(grade) == 10 & rawpoll_trump < 30)
```

```
##      state startdate enddate      pollster
## 1 Maryland 2016-09-27 2016-09-30 ABC News/Washington Post
## 2 Washington 2016-08-09 2016-08-13 Elway Research
```

```
## 3 California 2016-06-08 2016-07-02 Field Research Corporation (Field Poll)
## 4 Maryland 2016-03-30 2016-04-03 ABC News/Washington Post
## grade samplesize population rawpoll_clinton rawpoll_trump rawpoll_johnson
## 1 A+ 706 lv 63 27 4
## 2 A+ 350 lv 45 24 NA
## 3 A+ 495 lv 50 26 10
## 4 A+ 752 rv 63 28 NA
## rawpoll_mcmullin adjpoll_clinton adjpoll_trump adjpoll_johnson
## 1 NA 62.70862 28.73903 1.469119
## 2 NA 44.68377 27.79350 NA
## 3 NA 52.61833 29.79511 5.842896
## 4 NA 60.84333 30.40937 NA
## adjpoll_mcmullin
## 1 NA
## 2 NA
## 3 NA
## 4 NA
```

2.2.1.5

```
filter(polls_us_election_2016, adjpoll_clinton >=40 & adjpoll_clinton <=60 ) %>% head()
```

```
## state startdate enddate
## 1 U.S. 2016-11-03 2016-11-06
## 2 U.S. 2016-11-01 2016-11-07
## 3 U.S. 2016-11-02 2016-11-06
## 4 U.S. 2016-11-04 2016-11-07
## 5 U.S. 2016-11-03 2016-11-06
## 6 U.S. 2016-11-03 2016-11-06
##
## pollster grade samplesize
## 1 ABC News/Washington Post A+ 2220
## 2 Google Consumer Surveys B 26574
## 3 Ipsos A- 2195
## 4 YouGov B 3677
## 5 Gravis Marketing B- 16639
## 6 Fox News/Anderson Robbins Research/Shaw & Company Research A 1295
## population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1 lv 47.00 43.00 4.00 NA
## 2 lv 38.03 35.69 5.46 NA
## 3 lv 42.00 39.00 6.00 NA
## 4 lv 45.00 41.00 5.00 NA
## 5 rv 47.00 43.00 3.00 NA
## 6 lv 48.00 44.00 3.00 NA
## adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1 45.20163 41.72430 4.626221 NA
## 2 43.34557 41.21439 5.175792 NA
## 3 42.02638 38.81620 6.844734 NA
## 4 45.65676 40.92004 6.069454 NA
## 5 46.84089 42.33184 3.726098 NA
## 6 49.02208 43.95631 3.057876 NA
```

2.2.1.6

```
filter(polls_us_election_2016, rawpoll_trump >= rawpoll_clinton + 10) %>% head()
```

```
##      state startdate   enddate      pollster grade samplesize
## 1 Missouri 2016-10-31 2016-11-01 Public Policy Polling B+      1083
## 2 Missouri 2016-11-01 2016-11-02 Clarity Campaign Labs  B      1036
## 3 Missouri 2016-10-31 2016-11-01      Remington <NA>      1722
## 4      Utah 2016-11-03 2016-11-05      YouGov      B       762
## 5      Utah 2016-10-31 2016-11-02      Emerson College  B      1000
## 6      Utah 2016-11-03 2016-11-05      Trafalgar Group   C      1350
##      population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1             lv           37.00          50.00           4.00             NA
## 2             lv           38.00          54.00           NA             NA
## 3             lv           39.00          52.00           4.00             NA
## 4             lv           23.00          40.00           7.00          24.00
## 5             lv           19.60          39.80           3.00          27.60
## 6             lv           29.52          39.95           3.89          24.52
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1          36.55124      49.59908          5.028656             NA
## 2          37.65693      52.77196              NA             NA
## 3          39.02343      50.77483          5.124639             NA
## 4          23.83396      40.00230          8.169495          24.00000
## 5          19.75684      38.01440          3.075563          27.70142
## 6          29.32624      37.13456          5.055889          24.52000
```

2.2.1.7

```
filter(polls_us_election_2016, rawpoll_mcmullin > 5) %>% head()
```

```
##      state startdate   enddate      pollster grade samplesize population
## 1      Utah 2016-11-03 2016-11-05      YouGov      B       762          lv
## 2      Utah 2016-10-31 2016-11-02      Emerson College  B      1000          lv
## 3      Utah 2016-10-30 2016-10-31      Gravis Marketing B-      1424          rv
## 4      Utah 2016-11-03 2016-11-05      Trafalgar Group   C      1350          lv
## 5      Utah 2016-11-01 2016-11-07      SurveyMonkey    C-      1479          lv
## 6      Utah 2016-10-30 2016-11-02 Monmouth University  A+       402          lv
##      rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1             23.00          40.00           7.00          24.00
## 2             19.60          39.80           3.00          27.60
## 3             29.00          35.00           3.00          24.00
## 4             29.52          39.95           3.89          24.52
## 5             31.00          34.00           7.00          25.00
## 6             31.00          37.00           4.00          24.00
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1          23.83396      40.00230          8.169495          24.00000
## 2          19.75684      38.01440          3.075563          27.70142
## 3          29.04086      34.78405          3.422875          24.13522
## 4          29.32624      37.13456          5.055889          24.52000
## 5          29.59989      33.33115          4.692430          25.00000
## 6          30.06568      36.70382          4.644697          24.10142
```

2.2.2.1



```
filter(polls_us_election_2016, rawpoll_trump > 60 & startdate>="2016-01-01" & startdate<="2016-01-31")
```

```
##      state startdate   enddate      pollster grade samplesize population
## 1 Alabama 2016-01-12 2016-01-12 Strategy Research <NA>      2700          rv
##   rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1              32           68             NA             NA
##   adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1          30.92318          67.31449             NA             NA
```

This is the poll.

2.2.2.1

```
filter(polls_us_election_2016, is.na(grade)) %>% head(10)
```

```
##      state startdate   enddate      pollster grade
## 1   New Mexico 2016-11-06 2016-11-06      Zia Poll <NA>
## 2         U.S. 2016-11-05 2016-11-07 The Times-Picayune/Lucid <NA>
## 3         U.S. 2016-11-01 2016-11-07   USC Dornsife/LA Times <NA>
## 4   Virginia 2016-11-01 2016-11-02   Remington <NA>
## 5   Wisconsin 2016-11-01 2016-11-02   Remington <NA>
## 6   Pennsylvania 2016-11-01 2016-11-02   Remington <NA>
## 7 North Carolina 2016-11-01 2016-11-02   Remington <NA>
## 8         Ohio 2016-11-01 2016-11-02   Remington <NA>
## 9    Florida 2016-11-01 2016-11-02   Remington <NA>
## 10        U.S. 2016-11-04 2016-11-05 Morning Consult <NA>
##   samplesize population rawpoll_clinton rawpoll_trump rawpoll_johnson
## 1         8439          lv          46.00          44.00             6
## 2         2521          lv          45.00          40.00             5
## 3         2972          lv          43.61          46.84             NA
## 4         3076          lv          46.00          44.00             NA
## 5         2720          lv          49.00          41.00             NA
## 6         2683          lv          46.00          45.00             NA
## 7         2596          lv          45.00          48.00             NA
## 8         2557          lv          44.00          45.00             NA
## 9         2352          lv          45.00          48.00             NA
## 10        1482          lv          45.00          42.00             8
##   rawpoll_mcmullin adjpoll_clinton adjpoll_trump adjpoll_johnson
## 1              NA          44.82594          41.59978          7.870127
## 2              NA          45.13966          42.26495          3.679914
## 3              NA          45.32156          43.38579             NA
## 4              NA          45.27399          41.91459             NA
## 5              NA          48.22713          38.86464             NA
## 6              NA          45.30896          42.94988             NA
## 7              NA          44.39882          46.04110             NA
## 8              NA          43.03321          42.67245             NA
## 9              NA          44.85722          46.49677             NA
## 10             NA          46.28310          43.27167          6.904304
##   adjpoll_mcmullin
## 1              NA
## 2              NA
## 3              NA
## 4              NA
```

```
## 5          NA
## 6          NA
## 7          NA
## 8          NA
## 9          NA
## 10         NA
```

you need to change it to is.na. Otherwise R Studio won't understand your function

2.2.2.2

```
filter(polls_us_election_2016, is.na(rawpoll_mcmullin)) %>% head(10)
```

```
##      state startdate   enddate
## 1      U.S. 2016-11-03 2016-11-06
## 2      U.S. 2016-11-01 2016-11-07
## 3      U.S. 2016-11-02 2016-11-06
## 4      U.S. 2016-11-04 2016-11-07
## 5      U.S. 2016-11-03 2016-11-06
## 6      U.S. 2016-11-03 2016-11-06
## 7      U.S. 2016-11-02 2016-11-06
## 8      U.S. 2016-11-03 2016-11-05
## 9 New Mexico 2016-11-06 2016-11-06
## 10     U.S. 2016-11-04 2016-11-07
##
##                                pollster grade samplesize
## 1                                ABC News/Washington Post   A+      2220
## 2                                Google Consumer Surveys     B      26574
## 3                                Ipsos                       A-      2195
## 4                                YouGov                      B      3677
## 5                                Gravis Marketing            B-     16639
## 6 Fox News/Anderson Robbins Research/Shaw & Company Research   A      1295
## 7                                CBS News/New York Times     A-     1426
## 8                                NBC News/Wall Street Journal A-     1282
## 9                                Zia Poll                   <NA>     8439
## 10                               IBD/TIPP                   A-     1107
##
##      population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1          lv          47.00          43.00          4.00          NA
## 2          lv          38.03          35.69          5.46          NA
## 3          lv          42.00          39.00          6.00          NA
## 4          lv          45.00          41.00          5.00          NA
## 5          rv          47.00          43.00          3.00          NA
## 6          lv          48.00          44.00          3.00          NA
## 7          lv          45.00          41.00          5.00          NA
## 8          lv          44.00          40.00          6.00          NA
## 9          lv          46.00          44.00          6.00          NA
## 10         lv          41.20          42.70          7.10          NA
##
##      adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1          45.20163          41.72430          4.626221          NA
## 2          43.34557          41.21439          5.175792          NA
## 3          42.02638          38.81620          6.844734          NA
## 4          45.65676          40.92004          6.069454          NA
## 5          46.84089          42.33184          3.726098          NA
## 6          49.02208          43.95631          3.057876          NA
## 7          45.11649          40.92722          4.341786          NA
```

## 8	43.58576	40.77325	5.365788	NA
## 9	44.82594	41.59978	7.870127	NA
## 10	42.92745	42.23545	6.316175	NA

4,178 rows withh McMullin are n/a. McMullin may not be very popular in the race so they do not keep very accurate polls on his statistics. He is therefore missing from very many polls.

### 2.2.2.3

```
filter(polls_us_election_2016, as.numeric(grade) == 9) %>% head()
```

##	state	startdate	enddate		pollster	grade	samplesize
## 1	U.S.	2016-11-03	2016-11-06				
## 2	U.S.	2016-11-01	2016-11-03				
## 3	Wisconsin	2016-10-26	2016-10-31				
## 4	North Carolina	2016-11-04	2016-11-06				
## 5	Florida	2016-10-20	2016-10-24				
## 6	New York	2016-11-03	2016-11-04				
##							
## 1	Fox News/Anderson Robbins Research/Shaw & Company Research				A		1295
## 2	Marist College				A		940
## 3	Marquette University				A		1255
## 4	Siena College				A		800
## 5	SurveyUSA				A		1251
## 6	Siena College				A		617
##	population	rawpoll_clinton	rawpoll_trump	rawpoll_johnson	rawpoll_mcmullin		
## 1	lv	48	44	3			NA
## 2	lv	44	43	6			NA
## 3	lv	46	40	4			NA
## 4	lv	44	44	3			NA
## 5	lv	48	45	2			NA
## 6	lv	51	34	5			NA
##	adjpoll_clinton	adjpoll_trump	adjpoll_johnson	adjpoll_mcmullin			
## 1	49.02208	43.95631	3.057876				NA
## 2	42.83406	43.43819	4.780429				NA
## 3	46.10344	40.97982	2.897062				NA
## 4	44.21875	45.08290	2.335250				NA
## 5	46.74555	45.86589	1.520730				NA
## 6	51.30942	35.12664	4.344325				NA

There is no n/a that comes up when we search specifically for a particular letter grade as n/a does not have a factor value

### 2.2.2.4

```
filter(polls_us_election_2016, is.na(grade) | as.numeric(grade)>0) %>% head(10)
```

##	state	startdate	enddate
## 1	U.S.	2016-11-03	2016-11-06
## 2	U.S.	2016-11-01	2016-11-07
## 3	U.S.	2016-11-02	2016-11-06
## 4	U.S.	2016-11-04	2016-11-07
## 5	U.S.	2016-11-03	2016-11-06

```
## 6      U.S. 2016-11-03 2016-11-06
## 7      U.S. 2016-11-02 2016-11-06
## 8      U.S. 2016-11-03 2016-11-05
## 9 New Mexico 2016-11-06 2016-11-06
## 10     U.S. 2016-11-04 2016-11-07
##
##                                     pollster grade samplesize
## 1                                     ABC News/Washington Post  A+      2220
## 2                                     Google Consumer Surveys   B      26574
## 3                                     Ipsos                      A-      2195
## 4                                     YouGov                     B      3677
## 5                                     Gravis Marketing          B-     16639
## 6 Fox News/Anderson Robbins Research/Shaw & Company Research  A      1295
## 7                                     CBS News/New York Times  A-     1426
## 8                                     NBC News/Wall Street Journal A-     1282
## 9                                     Zia Poll <NA>            8439
## 10                                    IBD/TIPP                 A-     1107
##
## population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1      lv      47.00      43.00      4.00      NA
## 2      lv      38.03      35.69      5.46      NA
## 3      lv      42.00      39.00      6.00      NA
## 4      lv      45.00      41.00      5.00      NA
## 5      rv      47.00      43.00      3.00      NA
## 6      lv      48.00      44.00      3.00      NA
## 7      lv      45.00      41.00      5.00      NA
## 8      lv      44.00      40.00      6.00      NA
## 9      lv      46.00      44.00      6.00      NA
## 10     lv      41.20      42.70      7.10      NA
##
## adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      45.20163      41.72430      4.626221      NA
## 2      43.34557      41.21439      5.175792      NA
## 3      42.02638      38.81620      6.844734      NA
## 4      45.65676      40.92004      6.069454      NA
## 5      46.84089      42.33184      3.726098      NA
## 6      49.02208      43.95631      3.057876      NA
## 7      45.11649      40.92722      4.341786      NA
## 8      43.58576      40.77325      5.365788      NA
## 9      44.82594      41.59978      7.870127      NA
## 10     42.92745      42.23545      6.316175      NA
```

It leads to printing of all columns with every possible grade and n/a as well.

#### 2.2.2.5

```
filter(polls_us_election_2016, is.na(grade) | as.numeric(grade) == 0) %>% head(10)
```

```
##      state startdate   enddate      pollster grade
## 1 New Mexico 2016-11-06 2016-11-06      Zia Poll <NA>
## 2      U.S. 2016-11-05 2016-11-07 The Times-Picayune/Lucid <NA>
## 3      U.S. 2016-11-01 2016-11-07   USC Dornsife/LA Times <NA>
## 4   Virginia 2016-11-01 2016-11-02      Remington <NA>
## 5   Wisconsin 2016-11-01 2016-11-02      Remington <NA>
## 6 Pennsylvania 2016-11-01 2016-11-02      Remington <NA>
## 7 North Carolina 2016-11-01 2016-11-02      Remington <NA>
## 8      Ohio 2016-11-01 2016-11-02      Remington <NA>
```

```
## 9      Florida 2016-11-01 2016-11-02      Remington <NA>
## 10      U.S. 2016-11-04 2016-11-05      Morning Consult <NA>
##      samplesize population rawpoll_clinton rawpoll_trump rawpoll_johnson
## 1      8439      lv      46.00      44.00      6
## 2      2521      lv      45.00      40.00      5
## 3      2972      lv      43.61      46.84      NA
## 4      3076      lv      46.00      44.00      NA
## 5      2720      lv      49.00      41.00      NA
## 6      2683      lv      46.00      45.00      NA
## 7      2596      lv      45.00      48.00      NA
## 8      2557      lv      44.00      45.00      NA
## 9      2352      lv      45.00      48.00      NA
## 10     1482      lv      45.00      42.00      8
##      rawpoll_mcmullin adjpoll_clinton adjpoll_trump adjpoll_johnson
## 1      NA      44.82594      41.59978      7.870127
## 2      NA      45.13966      42.26495      3.679914
## 3      NA      45.32156      43.38579      NA
## 4      NA      45.27399      41.91459      NA
## 5      NA      48.22713      38.86464      NA
## 6      NA      45.30896      42.94988      NA
## 7      NA      44.39882      46.04110      NA
## 8      NA      43.03321      42.67245      NA
## 9      NA      44.85722      46.49677      NA
## 10     NA      46.28310      43.27167      6.904304
##      adjpoll_mcmullin
## 1      NA
## 2      NA
## 3      NA
## 4      NA
## 5      NA
## 6      NA
## 7      NA
## 8      NA
## 9      NA
## 10     NA
```

Here we will only get the N/A columns approximately 10% of the sample (429 rows)

2.3.1

```
select(polls_us_election_2016, grade, grade, grade) %>% head(10)
```

```
##      grade
## 1      A+
## 2      B
## 3      A-
## 4      B
## 5      B-
## 6      A
## 7      A-
## 8      A-
## 9      <NA>
## 10     A-
```

Nothing changes if you repeat the same variable multiple times or if you only name the variable once.

### 2.3.2

```
select(polls_us_election_2016, contains("RAW", ignore.case = TRUE)) %>% head(10)
```

```
##      rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1           47.00         43.00          4.00             NA
## 2           38.03         35.69          5.46             NA
## 3           42.00         39.00          6.00             NA
## 4           45.00         41.00          5.00             NA
## 5           47.00         43.00          3.00             NA
## 6           48.00         44.00          3.00             NA
## 7           45.00         41.00          5.00             NA
## 8           44.00         40.00          6.00             NA
## 9           46.00         44.00          6.00             NA
## 10          41.20         42.70          7.10             NA
```

### 2.3.3

```
select(polls_us_election_2016, contains("clinton") | contains("trump")) %>% head(10)
```

```
##      rawpoll_clinton adjpoll_clinton rawpoll_trump adjpoll_trump
## 1           47.00         45.20163         43.00         41.72430
## 2           38.03         43.34557         35.69         41.21439
## 3           42.00         42.02638         39.00         38.81620
## 4           45.00         45.65676         41.00         40.92004
## 5           47.00         46.84089         43.00         42.33184
## 6           48.00         49.02208         44.00         43.95631
## 7           45.00         45.11649         41.00         40.92722
## 8           44.00         43.58576         40.00         40.77325
## 9           46.00         44.82594         44.00         41.59978
## 10          41.20         42.92745         42.70         42.23545
```

```
select(polls_us_election_2016, rawpoll_clinton:rawpoll_trump | adjpoll_clinton:adjpoll_trump) %>% head(10)
```

```
##      rawpoll_clinton rawpoll_trump adjpoll_clinton adjpoll_trump
## 1           47.00         43.00         45.20163         41.72430
## 2           38.03         35.69         43.34557         41.21439
## 3           42.00         39.00         42.02638         38.81620
## 4           45.00         41.00         45.65676         40.92004
## 5           47.00         43.00         46.84089         42.33184
## 6           48.00         44.00         49.02208         43.95631
## 7           45.00         41.00         45.11649         40.92722
## 8           44.00         40.00         43.58576         40.77325
## 9           46.00         44.00         44.82594         41.59978
## 10          41.20         42.70         42.92745         42.23545
```

```
select(polls_us_election_2016, rawpoll_clinton:adjpoll_trump & -rawpoll_johnson & -rawpoll_mcmullin) %>% head(10)
```

```
##      rawpoll_clinton rawpoll_trump adjpoll_clinton adjpoll_trump
```

```
## 1      47.00      43.00      45.20163      41.72430
## 2      38.03      35.69      43.34557      41.21439
## 3      42.00      39.00      42.02638      38.81620
## 4      45.00      41.00      45.65676      40.92004
## 5      47.00      43.00      46.84089      42.33184
## 6      48.00      44.00      49.02208      43.95631
## 7      45.00      41.00      45.11649      40.92722
## 8      44.00      40.00      43.58576      40.77325
## 9      46.00      44.00      44.82594      41.59978
## 10     41.20      42.70      42.92745      42.23545
```

3.1

```
polls_us_election_2016 %>% arrange(desc(rawpoll_clinton))%>%head(1)
```

```
##           state startdate   enddate   pollster grade samplesize
## 1 District of Columbia 2016-10-30 2016-11-06 SurveyMonkey C-      315
##   population rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1         lv             88             7             2             NA
##   adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      86.70544      6.406481      -0.3226397             NA
```

3.2

```
polls_us_election_2016 %>% arrange(desc(samplesize))%>%head(5)
```

```
##   state startdate   enddate   pollster grade samplesize population
## 1 U.S. 2016-10-04 2016-11-06   YouGov    B      84292         lv
## 2 U.S. 2016-10-31 2016-11-06 SurveyMonkey C-      70194         lv
## 3 U.S. 2016-10-24 2016-10-30 SurveyMonkey C-      40816         lv
## 4 U.S. 2016-08-29 2016-09-04 SurveyMonkey C-      32226         rv
## 5 U.S. 2016-10-17 2016-10-23 SurveyMonkey C-      32225         lv
##   rawpoll_clinton rawpoll_trump rawpoll_johnson rawpoll_mcmullin
## 1             42.9             39             4.7             NA
## 2             47.0             41             6.0             NA
## 3             47.0             41             6.0             NA
## 4             41.0             37            12.0             NA
## 5             46.0             41             7.0             NA
##   adjpoll_clinton adjpoll_trump adjpoll_johnson adjpoll_mcmullin
## 1      43.74084      41.38541      4.411561             NA
## 2      45.65592      40.37888      3.677361             NA
## 3      45.69879      41.59350      2.920829             NA
## 4      43.43152      42.04099      4.978575             NA
## 5      44.61705      42.86125      3.103545             NA
```

3.3

```
polls_us_election_2016 %>% arrange(desc(is.na(rawpoll_johnson))) %>% head(10)
```

```
##           state startdate   enddate   pollster grade samplesize
## 1           U.S. 2016-11-01 2016-11-07 USC Dornsife/LA Times <NA>      2972
```

## 2	Ohio	2016-11-02	2016-11-04	YouGov	B	1189
## 3	Virginia	2016-11-01	2016-11-02	Remington	<NA>	3076
## 4	North Carolina	2016-10-31	2016-11-01	Public Policy Polling	B+	1169
## 5	Wisconsin	2016-11-01	2016-11-02	Remington	<NA>	2720
## 6	Pennsylvania	2016-11-01	2016-11-02	Remington	<NA>	2683
## 7	North Carolina	2016-11-01	2016-11-02	Remington	<NA>	2596
## 8	Ohio	2016-11-01	2016-11-02	Remington	<NA>	2557
## 9	U.S.	2016-10-31	2016-11-06	CVOTER International	C+	1625
## 10	Florida	2016-11-01	2016-11-02	Remington	<NA>	2352
##	population	rawpoll_clinton	rawpoll_trump	rawpoll_johnson	rawpoll_mcmullin	
## 1	lv	43.61	46.84	NA	NA	
## 2	lv	45.00	46.00	NA	NA	
## 3	lv	46.00	44.00	NA	NA	
## 4	lv	49.00	47.00	NA	NA	
## 5	lv	49.00	41.00	NA	NA	
## 6	lv	46.00	45.00	NA	NA	
## 7	lv	45.00	48.00	NA	NA	
## 8	lv	44.00	45.00	NA	NA	
## 9	lv	48.91	46.13	NA	NA	
## 10	lv	45.00	48.00	NA	NA	
##	adjpoll_clinton	adjpoll_trump	adjpoll_johnson	adjpoll_mcmullin		
## 1	45.32156	43.38579	NA	NA		
## 2	44.93624	45.09646	NA	NA		
## 3	45.27399	41.91459	NA	NA		
## 4	47.90348	45.94813	NA	NA		
## 5	48.22713	38.86464	NA	NA		
## 6	45.30896	42.94988	NA	NA		
## 7	44.39882	46.04110	NA	NA		
## 8	43.03321	42.67245	NA	NA		
## 9	47.01806	42.04561	NA	NA		
## 10	44.85722	46.49677	NA	NA		

```
polls_us_election_2016 %>% arrange(desc(is.na(rawpoll_clinton))) %>% head(10)
```

##	state	startdate	enddate		
## 1	U.S.	2016-11-03	2016-11-06		
## 2	U.S.	2016-11-01	2016-11-07		
## 3	U.S.	2016-11-02	2016-11-06		
## 4	U.S.	2016-11-04	2016-11-07		
## 5	U.S.	2016-11-03	2016-11-06		
## 6	U.S.	2016-11-03	2016-11-06		
## 7	U.S.	2016-11-02	2016-11-06		
## 8	U.S.	2016-11-03	2016-11-05		
## 9	New Mexico	2016-11-06	2016-11-06		
## 10	U.S.	2016-11-04	2016-11-07		
##				pollster	grade samplesize
## 1				ABC News/Washington Post	A+ 2220
## 2				Google Consumer Surveys	B 26574
## 3				Ipsos	A- 2195
## 4				YouGov	B 3677
## 5				Gravis Marketing	B- 16639
## 6	Fox News/Anderson Robbins Research/Shaw & Company Research				A 1295
## 7				CBS News/New York Times	A- 1426
## 8				NBC News/Wall Street Journal	A- 1282



## 9				Zia Poll	<NA>	8439
## 10				IBD/TIPP	A-	1107
##	population	rawpoll_clinton	rawpoll_trump	rawpoll_johnson	rawpoll_mcmullin	
## 1	lv	47.00	43.00	4.00		NA
## 2	lv	38.03	35.69	5.46		NA
## 3	lv	42.00	39.00	6.00		NA
## 4	lv	45.00	41.00	5.00		NA
## 5	rv	47.00	43.00	3.00		NA
## 6	lv	48.00	44.00	3.00		NA
## 7	lv	45.00	41.00	5.00		NA
## 8	lv	44.00	40.00	6.00		NA
## 9	lv	46.00	44.00	6.00		NA
## 10	lv	41.20	42.70	7.10		NA
##	adjpoll_clinton	adjpoll_trump	adjpoll_johnson	adjpoll_mcmullin		
## 1	45.20163	41.72430	4.626221		NA	
## 2	43.34557	41.21439	5.175792		NA	
## 3	42.02638	38.81620	6.844734		NA	
## 4	45.65676	40.92004	6.069454		NA	
## 5	46.84089	42.33184	3.726098		NA	
## 6	49.02208	43.95631	3.057876		NA	
## 7	45.11649	40.92722	4.341786		NA	
## 8	43.58576	40.77325	5.365788		NA	
## 9	44.82594	41.59978	7.870127		NA	
## 10	42.92745	42.23545	6.316175		NA	

```
polls_us_election_2016 %>% arrange(desc(is.na(rawpoll_trump))) %>% head(10)
```

##	state	startdate	enddate			
## 1	U.S.	2016-11-03	2016-11-06			
## 2	U.S.	2016-11-01	2016-11-07			
## 3	U.S.	2016-11-02	2016-11-06			
## 4	U.S.	2016-11-04	2016-11-07			
## 5	U.S.	2016-11-03	2016-11-06			
## 6	U.S.	2016-11-03	2016-11-06			
## 7	U.S.	2016-11-02	2016-11-06			
## 8	U.S.	2016-11-03	2016-11-05			
## 9	New Mexico	2016-11-06	2016-11-06			
## 10	U.S.	2016-11-04	2016-11-07			
##				pollster	grade	samplesize
## 1				ABC News/Washington Post	A+	2220
## 2				Google Consumer Surveys	B	26574
## 3				Ipsos	A-	2195
## 4				YouGov	B	3677
## 5				Gravis Marketing	B-	16639
## 6	Fox News/Anderson Robbins Research/Shaw & Company Research				A	1295
## 7				CBS News/New York Times	A-	1426
## 8				NBC News/Wall Street Journal	A-	1282
## 9				Zia Poll	<NA>	8439
## 10				IBD/TIPP	A-	1107
##	population	rawpoll_clinton	rawpoll_trump	rawpoll_johnson	rawpoll_mcmullin	
## 1	lv	47.00	43.00	4.00		NA
## 2	lv	38.03	35.69	5.46		NA
## 3	lv	42.00	39.00	6.00		NA
## 4	lv	45.00	41.00	5.00		NA

## 5	rv	47.00	43.00	3.00	NA
## 6	lv	48.00	44.00	3.00	NA
## 7	lv	45.00	41.00	5.00	NA
## 8	lv	44.00	40.00	6.00	NA
## 9	lv	46.00	44.00	6.00	NA
## 10	lv	41.20	42.70	7.10	NA
##	adjpoll_clinton	adjpoll_trump	adjpoll_johnson	adjpoll_mcmullin	
## 1	45.20163	41.72430	4.626221	NA	
## 2	43.34557	41.21439	5.175792	NA	
## 3	42.02638	38.81620	6.844734	NA	
## 4	45.65676	40.92004	6.069454	NA	
## 5	46.84089	42.33184	3.726098	NA	
## 6	49.02208	43.95631	3.057876	NA	
## 7	45.11649	40.92722	4.341786	NA	
## 8	43.58576	40.77325	5.365788	NA	
## 9	44.82594	41.59978	7.870127	NA	
## 10	42.92745	42.23545	6.316175	NA	

```
polls_us_election_2016 %>% arrange(desc(is.na(rawpoll_mcmullin))) %>% head(10)
```

##	state	startdate	enddate		
## 1	U.S.	2016-11-03	2016-11-06		
## 2	U.S.	2016-11-01	2016-11-07		
## 3	U.S.	2016-11-02	2016-11-06		
## 4	U.S.	2016-11-04	2016-11-07		
## 5	U.S.	2016-11-03	2016-11-06		
## 6	U.S.	2016-11-03	2016-11-06		
## 7	U.S.	2016-11-02	2016-11-06		
## 8	U.S.	2016-11-03	2016-11-05		
## 9	New Mexico	2016-11-06	2016-11-06		
## 10	U.S.	2016-11-04	2016-11-07		
##				pollster	grade
## 1				ABC News/Washington Post	A+
## 2				Google Consumer Surveys	B
## 3				Ipsos	A-
## 4				YouGov	B
## 5				Gravis Marketing	B-
## 6	Fox News/Anderson Robbins Research/Shaw & Company Research				A
## 7				CBS News/New York Times	A-
## 8				NBC News/Wall Street Journal	A-
## 9				Zia Poll	<NA>
## 10				IBD/TIPP	A-
##	population	rawpoll_clinton	rawpoll_trump	rawpoll_johnson	rawpoll_mcmullin
## 1	lv	47.00	43.00	4.00	NA
## 2	lv	38.03	35.69	5.46	NA
## 3	lv	42.00	39.00	6.00	NA
## 4	lv	45.00	41.00	5.00	NA
## 5	rv	47.00	43.00	3.00	NA
## 6	lv	48.00	44.00	3.00	NA
## 7	lv	45.00	41.00	5.00	NA
## 8	lv	44.00	40.00	6.00	NA
## 9	lv	46.00	44.00	6.00	NA
## 10	lv	41.20	42.70	7.10	NA
##	adjpoll_clinton	adjpoll_trump	adjpoll_johnson	adjpoll_mcmullin	

## 1	45.20163	41.72430	4.626221	NA
## 2	43.34557	41.21439	5.175792	NA
## 3	42.02638	38.81620	6.844734	NA
## 4	45.65676	40.92004	6.069454	NA
## 5	46.84089	42.33184	3.726098	NA
## 6	49.02208	43.95631	3.057876	NA
## 7	45.11649	40.92722	4.341786	NA
## 8	43.58576	40.77325	5.365788	NA
## 9	44.82594	41.59978	7.870127	NA
## 10	42.92745	42.23545	6.316175	NA

You put the poll you want to observe within the brackets of `is.na()`

4.1

```
rawcandidate <- polls_us_election_2016 %>%
  mutate(raw_trump=rawpoll_trump/100*samplesize) %>%
  mutate(raw_clinton=rawpoll_clinton/100*samplesize) %>%
  mutate(raw_johnson=rawpoll_johnson/100*samplesize) %>%
  mutate(raw_mcmullin=rawpoll_mcmullin/100*samplesize)

View(rawcandidate %>% head(10))
```

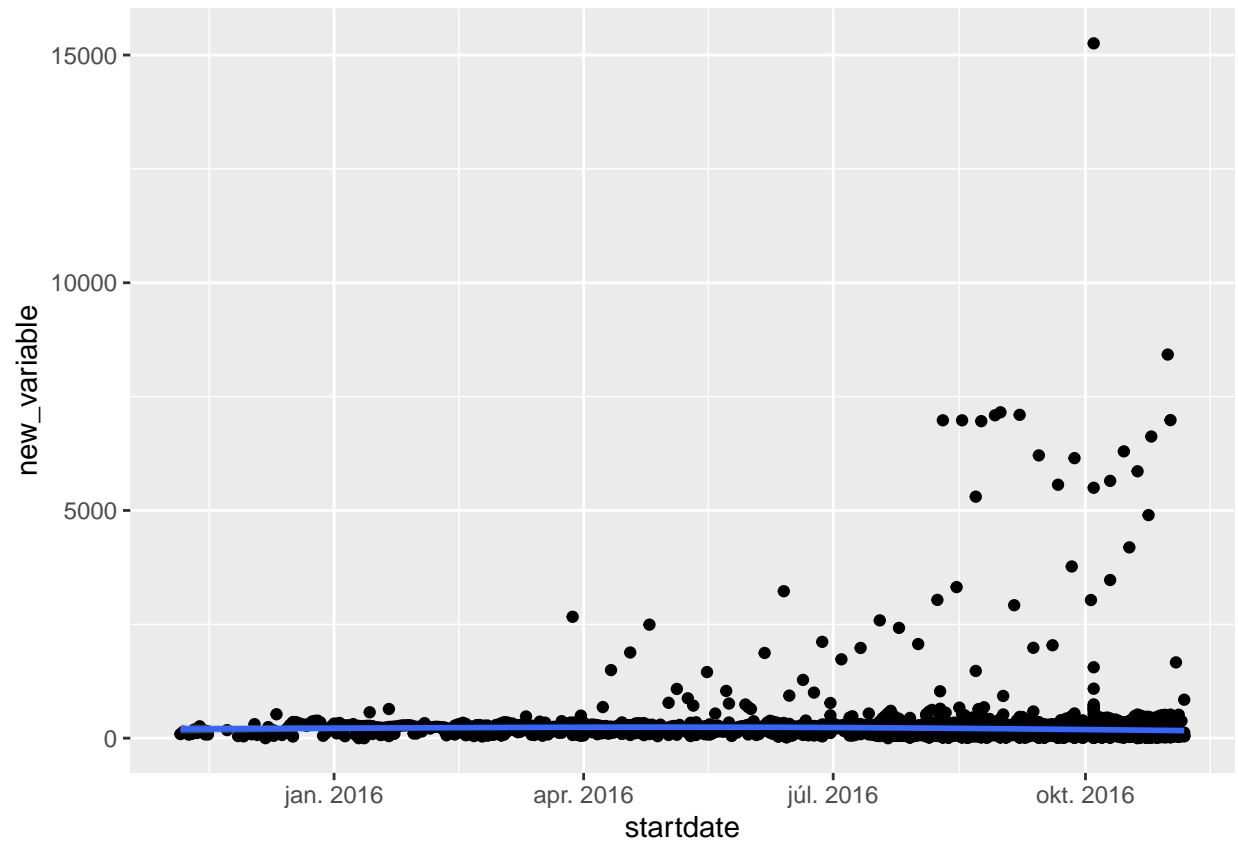
4.2

```
df1 <- rawcandidate %>%
  mutate(new_variable=samplesize-(raw_trump+raw_clinton))
ggplot(data = df1,
       mapping = aes(x = startdate,
                     y = new_variable)) +
  geom_point() +
  geom_smooth(se=TRUE)

## 'geom_smooth()' using method = 'gam' and formula 'y ~ s(x, bs = "cs")'

## Warning: Removed 1 rows containing non-finite values (stat_smooth).

## Warning: Removed 1 rows containing missing values (geom_point).
```



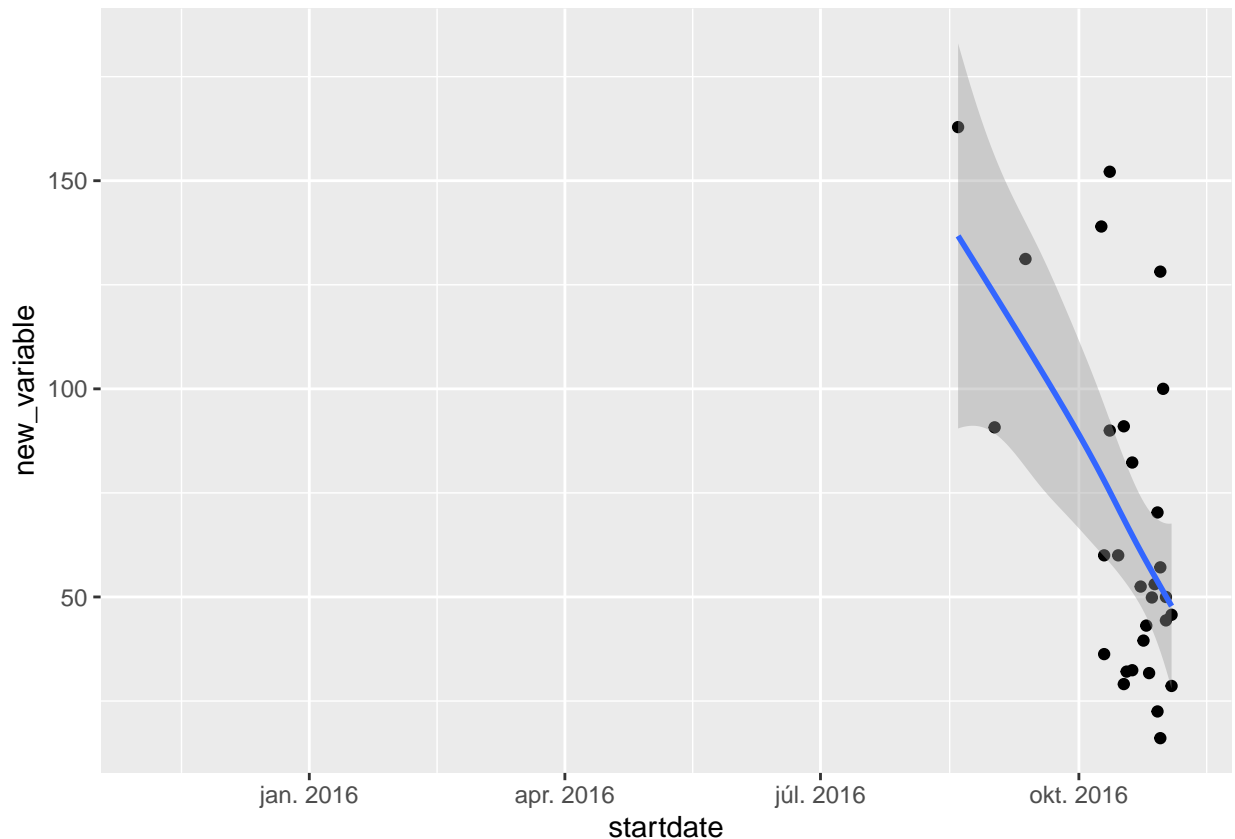
4.3

```
df2 <- df1%>%
  mutate(new_variable = samplesize-(raw_trump+raw_clinton+raw_johnson+raw_mcmullin))
ggplot(data = df2,
       mapping = aes(x = startdate,
                     y = new_variable)) +
  geom_point() +
  geom_smooth(se=TRUE)
```

```
## 'geom_smooth()' using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```

```
## Warning: Removed 4178 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 4178 rows containing missing values (geom_point).
```



4.4 The reason why is because Johnson is a big candidate and he polled very well close to the election. We also need to take McMuller out of the picture although he was less significant. He polled very well in Utah for example with 21.5 percent of the votes and third in Idaho.

4.5 This mostly fixes the problem since Johnson was such a big candidate and when he is out of the picture, there is very little disturbing the data.

4.6

```
polls_us_election_2016 %>%
  select(startdate, pollster, rawpoll_johnson) %>%
  group_by(startdate) %>%
  mutate(rank = min_rank(desc(rawpoll_johnson)), ties.method = 'first') %>%
  head(10)
```

```
## # A tibble: 10 x 5
## # Groups:   startdate [5]
##   startdate pollster rawpoll_johnson rank ties.method
##   <date>     <fct>          <dbl> <int> <chr>
## 1 2016-11-03 ABC News/Washington Post      4     12 first
## 2 2016-11-01 Google Consumer Surveys    5.46    85 first
## 3 2016-11-02 Ipsos                      6       2 first
## 4 2016-11-04 YouGov                     5       5 first
## 5 2016-11-03 Gravis Marketing             3     22 first
## 6 2016-11-03 Fox News/Anderson Robbins Resea~ 3     22 first
## 7 2016-11-02 CBS News/New York Times      5       6 first
## 8 2016-11-03 NBC News/Wall Street Journal  6       5 first
```

```
## 9 2016-11-06 Zia Poll 6 2 first
## 10 2016-11-04 IBD/TIPP 7.1 2 first
```

We break ties with the first row that comes up.

5.1

```
polls_us_election_2016 %>%
  count(pollster) %>%
  head(10)
```

```
##           pollster  n
## 1 ABC News/Washington Post 28
## 2 American Research Group 9
## 3 American Strategies 1
## 4 Angus Reid Global 1
## 5 Anzalone Liszt Grove Research 2
## 6 Arizona State University 2
## 7 Associated Industries of Florida 3
## 8 Baldwin Wallace University 2
## 9 Ball State University 1
## 10 Baruch College 1
```

```
polls_us_election_2016 %>%
  group_by(pollster) %>%
  summarise(pollster_n=n()) %>%
  head(10)
```

```
## 'summarise()' ungrouping output (override with '.groups' argument)
```

```
## # A tibble: 10 x 2
##   pollster pollster_n
##   <fct>      <int>
## 1 ABC News/Washington Post 28
## 2 American Research Group 9
## 3 American Strategies 1
## 4 Angus Reid Global 1
## 5 Anzalone Liszt Grove Research 2
## 6 Arizona State University 2
## 7 Associated Industries of Florida 3
## 8 Baldwin Wallace University 2
## 9 Ball State University 1
## 10 Baruch College 1
```

5.2

```
polls_us_election_2016 %>%
  group_by(state) %>%
  filter(state=="Florida") %>%
  summarise(mean=mean(samplesize))
```

```
## 'summarise()' ungrouping output (override with '.groups' argument)
```

```
## # A tibble: 10 x 2
##   grade mean
##   <fct> <dbl>
## 1 C-    2290.
## 2 C      780.
## 3 C+     714.
## 4 B-    1322.
## 5 B     1285.
## 6 B+     754.
## 7 A-     825.
## 8 A     1221.
## 9 A+     536.
## 10 <NA> 1000.
```

5.3

```
polls_us_election_2016 %>%
  group_by(pollster)%>%
  count(grade)
```

```
## # A tibble: 196 x 3
## # Groups:   pollster [196]
##   pollster          grade      n
##   <fct>          <fct> <int>
## 1 ABC News/Washington Post A+         28
## 2 American Research Group  C+          9
## 3 American Strategies      <NA>          1
## 4 Angus Reid Global        A-          1
## 5 Anzalone Liszt Grove Research C           2
## 6 Arizona State University C+           2
## 7 Associated Industries of Florida <NA>          3
## 8 Baldwin Wallace University <NA>          2
## 9 Ball State University     <NA>          1
## 10 Baruch College           B-           1
## # ... with 186 more rows
```

It seems so?

5.4

```
polls_us_election_2016 %>%
  group_by(state)%>%
  arrange(rawpoll_mcmullin)
```

```
## # A tibble: 4,208 x 15
## # Groups:   state [57]
##   state startdate enddate pollster grade samplesize population
##   <fct> <date>      <date> <fct> <fct>      <int> <chr>
## 1 Utah  2016-08-19 2016-08-21 Public ~ B+      1018 lv
## 2 Utah  2016-09-01 2016-09-09 Dan Jon~ C+        605 lv
## 3 Utah  2016-09-12 2016-09-19 Dan Jon~ C+        820 lv
## 4 Utah  2016-10-09 2016-10-09 Google ~ B        500 a
## 5 Utah  2016-10-10 2016-10-12 Monmout~ A+        403 lv
```

```
## 6 Utah 2016-10-12 2016-10-14 YouGov B 951 lv
## 7 Utah 2016-10-29 2016-10-31 Rasmuss~ C+ 750 lv
## 8 Utah 2016-10-10 2016-10-11 Y2 Anal~ C+ 500 lv
## 9 Utah 2016-11-03 2016-11-05 YouGov B 762 lv
## 10 Utah 2016-10-30 2016-10-31 Gravis ~ B- 1424 rv
## # ... with 4,198 more rows, and 8 more variables: rawpoll_clinton <dbl>,
## # rawpoll_trump <dbl>, rawpoll_johnson <dbl>, rawpoll_mcmullin <dbl>,
## # adjpoll_clinton <dbl>, adjpoll_trump <dbl>, adjpoll_johnson <dbl>,
## # adjpoll_mcmullin <dbl>
```

## 5.5

```
polls_us_election_2016 %>%
  group_by(state) %>%
  summarize(pollster_n=n()) %>%
  filter(pollster_n>10) %>%
  arrange(desc(pollster_n))
```

```
## 'summarise()' ungrouping output (override with '.groups' argument)
```

```
## # A tibble: 54 x 2
##   state      pollster_n
##   <fct>      <int>
## 1 U.S.      1106
## 2 Florida   148
## 3 North Carolina 125
## 4 Pennsylvania 125
## 5 Ohio      115
## 6 New Hampshire 112
## 7 Nevada     93
## 8 Virginia    91
## 9 Michigan    86
## 10 Colorado    80
## # ... with 44 more rows
```

## 5.6

```
polls_us_election_2016 %>%
  group_by(grade, population) %>%
  summarize(max_n=max(rawpoll_trump), min_n=min(rawpoll_trump)) %>%
  arrange(desc(max_n), desc(min_n))
```

```
## 'summarise()' regrouping output by 'grade' (override with '.groups' argument)
```

```
## # A tibble: 29 x 4
## # Groups:   grade [11]
##   grade population max_n min_n
##   <fct> <chr>      <dbl> <dbl>
## 1 <NA> rv          68 28
## 2 B lv          65 6.8
## 3 C- lv          62 4
## 4 B- lv          61 25
```



```
## 5 A-    lv          61 21.3
## 6 B+    lv          60 17
## 7 <NA>   lv          58 25
## 8 C+    lv          58 22
## 9 B+    v           57 28
## 10 C-   rv          57 24
## # ... with 19 more rows
```

5.7

```
polls_us_election_2016 %>%
  filter(state == "Alabama" | state == "Arkansas") %>%
  summarize(pollster_n=n()) %>%
  arrange(desc(pollster_n))
```

```
## pollster_n
## 1          88
```

There are 88 pollsters running polls in Alabama and Arkansas

```
polls_us_election_2016 %>%
  #group_by(state) %>%
  filter(state != "Alabama" & state != "Arkansas") %>%
  summarize(pollster_n=n_distinct(pollster)) %>%
  arrange(desc(pollster_n))
```

```
## pollster_n
## 1          193
```

There are 193 companies running in the United States excluding the the companies running polls Alabama and Arkansas

6.1.a

```
df3 <- polls_us_election_2016 %>%
  mutate(spread=(rawpoll_trump - rawpoll_clinton)/100)
```

```
View(df3 %>% head(10))
```

```
df4 <- polls_us_election_2016%>%
  mutate(spread=(rawpoll_trump - rawpoll_clinton)/100) %>%
  group_by(pollster) %>%
  summarize(spread, mean_spread_n=mean(spread))
```

```
## 'summarise()' regrouping output by 'pollster' (override with '.groups' argument)
```

```
df4 #>% head(10)
```

```
## # A tibble: 4,208 x 3
## # Groups:   pollster [196]
##   pollster      spread mean_spread_n
##   <fct>         <dbl>         <dbl>
## 1 ABC News/Washington Post -0.04      -0.0668
## 2 ABC News/Washington Post -0.06      -0.0668
## 3 ABC News/Washington Post -0.04      -0.0668
## 4 ABC News/Washington Post -0.05      -0.0668
## 5 ABC News/Washington Post -0.36      -0.0668
## 6 ABC News/Washington Post -0.04      -0.0668
## 7 ABC News/Washington Post -0.03      -0.0668
## 8 ABC News/Washington Post -0.02      -0.0668
## 9 ABC News/Washington Post  0          -0.0668
## 10 ABC News/Washington Post  0.01      -0.0668
## # ... with 4,198 more rows
```

6.1.b.a

```
df5 <- df3%>%
  mutate(p=(spread+1)/2)
```

```
View(df5 %>% head(10))
```

6.1.b.b

```
df6 <- df5%>%
  mutate(sd=2*sqrt((p*(1-p)/samplesize)))
View(df6)
```

It's true because this is a typical proportional sample and the two candidates dominate.

6.1.b.c

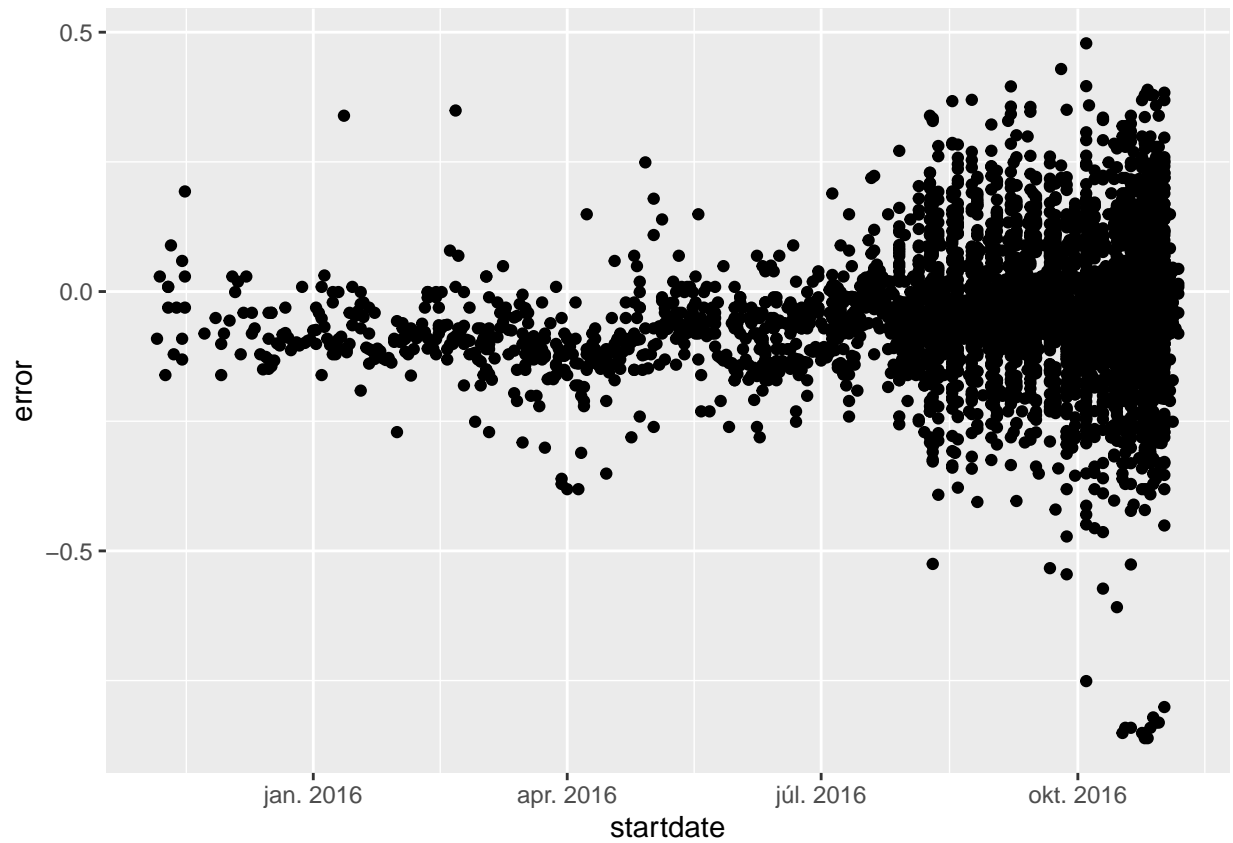
```
df7 <- df6%>%
  mutate(lci=spread-qnorm(0.975)*sd) %>%
  mutate(uci=spread+qnorm(0.975)*sd)
View(df7 %>% head(10))
```

the new columns, lci and uci show the upper and lower levels of the confidence levels for each poll

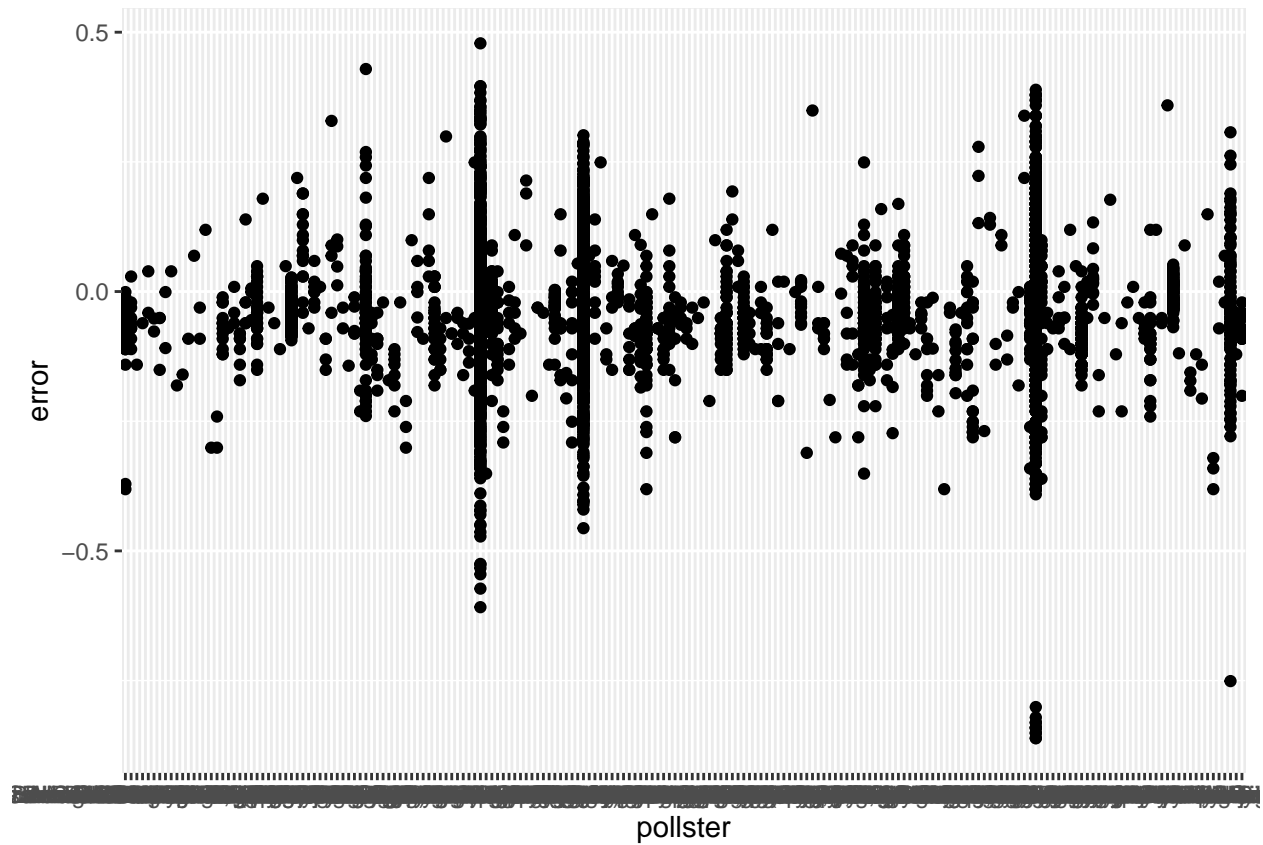
6.1.c

```
df8<- df7%>%
  mutate(error=spread-0.021)
View(df8 %>% head(10))

ggplot(data = df8, aes(x = startdate, y = error,
                      group = pollster))+
  geom_point()
```



```
ggplot(data = df8, aes(x = pollster, y = error,  
                        group = pollster))+  
  geom_point()
```



```
#flipping the axis to show the pollsters
ggplot(data = df8, aes(x = error, y = pollster,
                       group = pollster))+
  theme(axis.text.x = element_text(angle = 90))+
  geom_point()
```

pollster

