Tidyverse_Yuanyuan Lin

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2019/10/3

Question 1

(1).There are five continents in the data set

```
data<-gapminder
unique(data$continent)
```

```
## [1] Asia     Europe   Africa   Americas Oceania
## Levels: Africa Americas Asia Europe Oceania
```

(2).There are 142 countries included in the data set.

```
unique1<-unique(data$country)
unique1
```

```
##   [1] Afghanistan              Albania
##   [3] Algeria                  Angola
##   [5] Argentina                Australia
##   [7] Austria                  Bahrain
##   [9] Bangladesh               Belgium
##  [11] Benin                    Bolivia
##  [13] Bosnia and Herzegovina   Botswana
##  [15] Brazil                   Bulgaria
##  [17] Burkina Faso             Burundi
##  [19] Cambodia                 Cameroon
##  [21] Canada                   Central African Republic
##  [23] Chad                     Chile
##  [25] China                    Colombia
##  [27] Comoros                  Congo, Dem. Rep.
##  [29] Congo, Rep.              Costa Rica
##  [31] Cote d'Ivoire            Croatia
##  [33] Cuba                     Czech Republic
##  [35] Denmark                  Djibouti
##  [37] Dominican Republic       Ecuador
##  [39] Egypt                    El Salvador
##  [41] Equatorial Guinea        Eritrea
##  [43] Ethiopia                 Finland
##  [45] France                   Gabon
##  [47] Gambia                   Germany
##  [49] Ghana                    Greece
##  [51] Guatemala                Guinea
##  [53] Guinea-Bissau            Haiti
##  [55] Honduras                 Hong Kong, China
##  [57] Hungary                  Iceland
##  [59] India                    Indonesia
```

```
##  [61] Iran                     Iraq
##  [63] Ireland                  Israel
##  [65] Italy                    Jamaica
##  [67] Japan                    Jordan
##  [69] Kenya                    Korea, Dem. Rep.
##  [71] Korea, Rep.              Kuwait
##  [73] Lebanon                  Lesotho
##  [75] Liberia                  Libya
##  [77] Madagascar               Malawi
##  [79] Malaysia                 Mali
##  [81] Mauritania               Mauritius
##  [83] Mexico                   Mongolia
##  [85] Montenegro               Morocco
##  [87] Mozambique               Myanmar
##  [89] Namibia                  Nepal
##  [91] Netherlands              New Zealand
##  [93] Nicaragua                Niger
##  [95] Nigeria                  Norway
##  [97] Oman                     Pakistan
##  [99] Panama                   Paraguay
## [101] Peru                     Philippines
## [103] Poland                   Portugal
## [105] Puerto Rico              Reunion
## [107] Romania                  Rwanda
## [109] Sao Tome and Principe    Saudi Arabia
## [111] Senegal                  Serbia
## [113] Sierra Leone             Singapore
## [115] Slovak Republic          Slovenia
## [117] Somalia                  South Africa
## [119] Spain                    Sri Lanka
## [121] Sudan                    Swaziland
## [123] Sweden                   Switzerland
## [125] Syria                    Taiwan
## [127] Tanzania                 Thailand
## [129] Togo                     Trinidad and Tobago
## [131] Tunisia                  Turkey
## [133] Uganda                   United Kingdom
## [135] United States            Uruguay
## [137] Venezuela                Vietnam
## [139] West Bank and Gaza       Yemen, Rep.
## [141] Zambia                   Zimbabwe
## 142 Levels: Afghanistan Albania Algeria Angola Argentina ... Zimbabwe
```

(3).Countries per continent is shown in the table below

```
data%>%group_by(data$continent) %>% summarise(number = n())
```

```
## # A tibble: 5 x 2
##   `data$continent` number
##   <fct>             <int>
## 1 Africa              624
## 2 Americas            300
## 3 Asia                396
```

```
## 4 Europe              360
## 5 Oceania              24
```

(4).total population per continent and GDP per capita group by continent

```
table0<-data%>%group_by(continent)%>%summarise(mean_GPD_per_capita=mean(gdpPercap),mean_pop=mean(pop))
table0
```

```
## # A tibble: 5 x 3
##   continent mean_GPD_per_capita  mean_pop
##   <fct>                   <dbl>     <dbl>
## 1 Africa                  2194.  9916003.
## 2 Americas                7136. 24504795.
## 3 Asia                    7902. 77038722.
## 4 Europe                 14469. 17169765.
## 5 Oceania                18622.  8874672.
```

(5)GDP per capita for the countries in each continent, contrasting the years 1952 and 2007.

```
table1<-gapminder2007 <- filter(data,year == 2007)%>%group_by(continent)%>%summarise(mean_GPD_per_capita
table1
```

```
## # A tibble: 5 x 2
##   continent mean_GPD_per_capita_2007
##   <fct>                         <dbl>
## 1 Africa                         3089.
## 2 Americas                      11003.
## 3 Asia                          12473.
## 4 Europe                        25054.
## 5 Oceania                       29810.
```

```
## # A tibble: 5 x 2
##   continent mean_GPD_per_capita_1952
##   <fct>                         <dbl>
## 1 Africa                         1253.
## 2 Americas                       4079.
## 3 Asia                           5195.
## 4 Europe                         5661.
## 5 Oceania                       10298.
```

```
##   continent mean_GPD_per_capita_2007 mean_GPD_per_capita_1952
## 1    Africa                3089.033                 1252.572
## 2  Americas               11003.032                 4079.063
## 3      Asia               12473.027                 5195.484
## 4    Europe               25054.482                 5661.057
## 5   Oceania               29810.188                10298.086
```

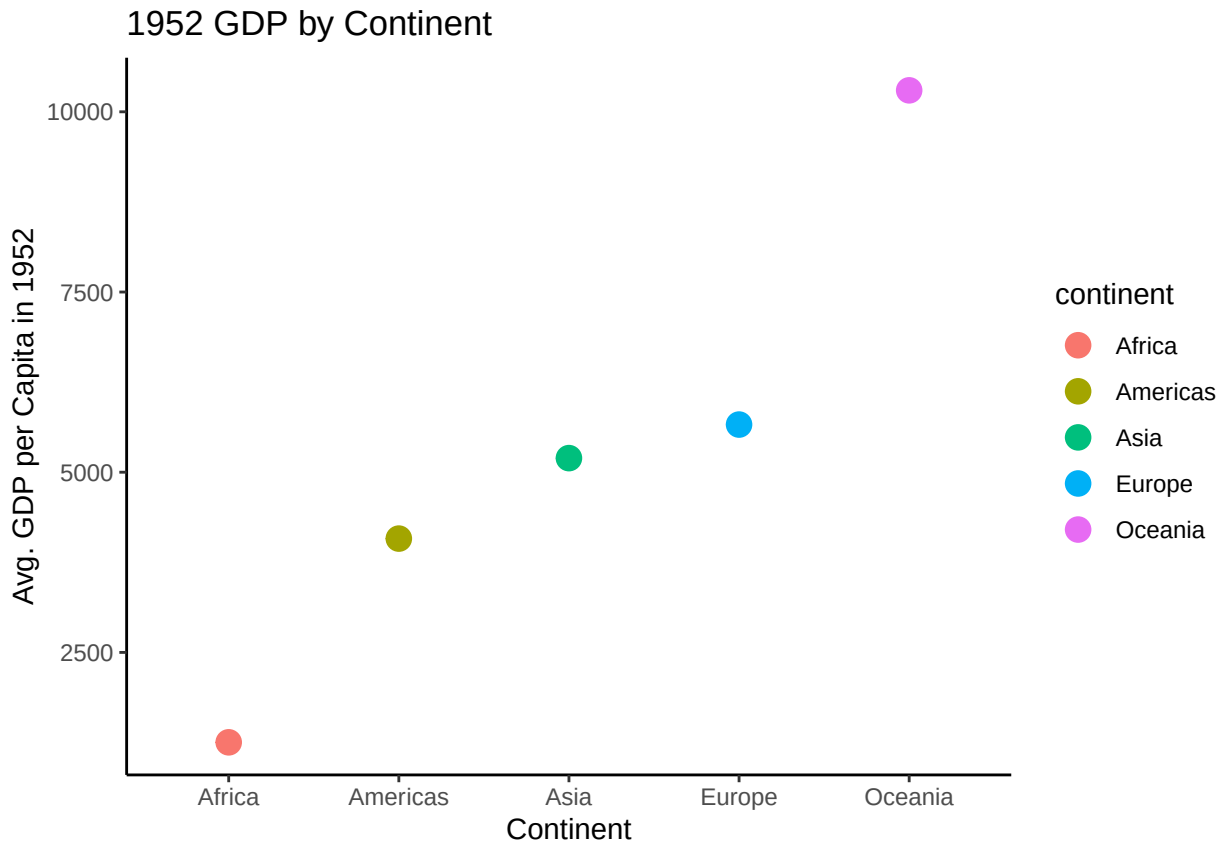
```
kable_1<-kable(new_table, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the tab
      col.names = c("continent", "mean_GPD_per_capita_2007", "mean_GPD_per_capita_1952"),
      caption = "Total population and GDP per capita by continent" )
kable_1
```

Table 1: Total population and GDP per capita by continent

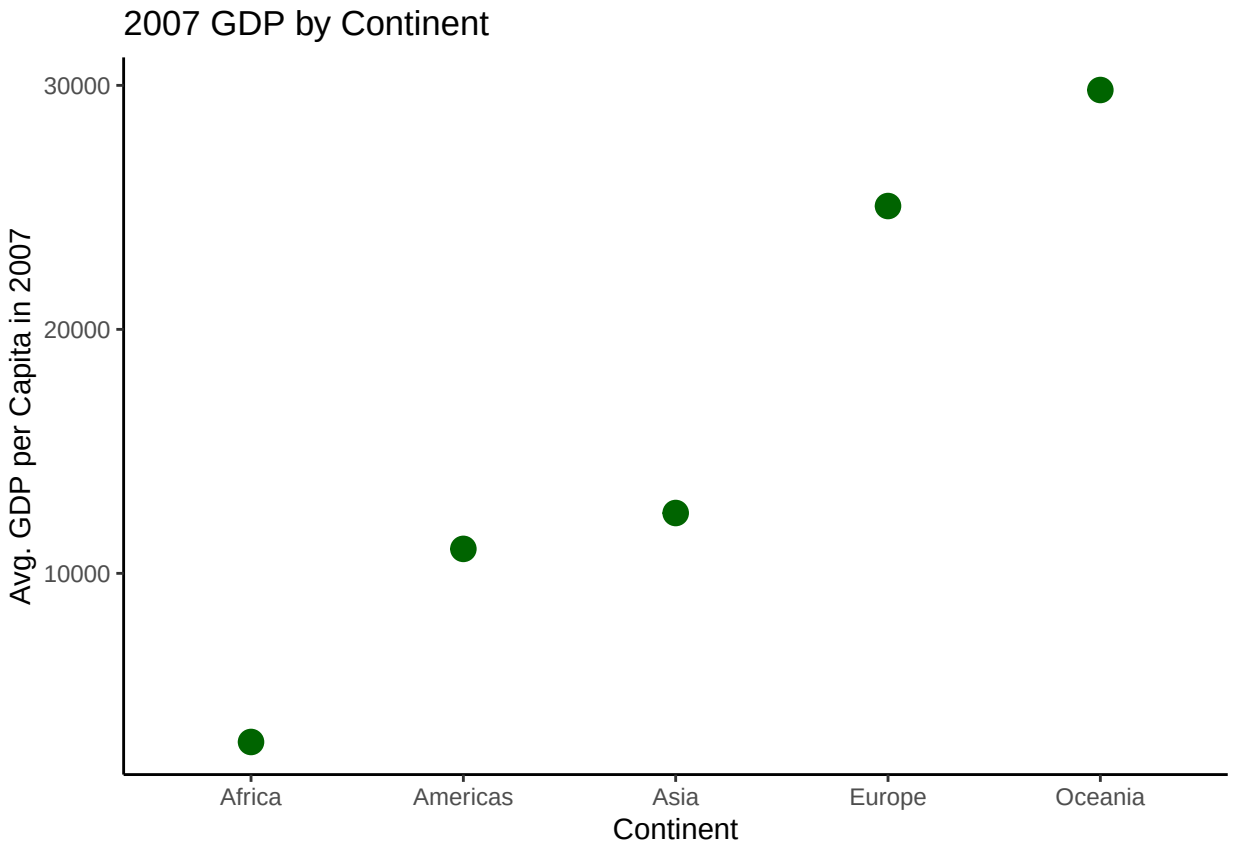
continent	mean_GPD_per_capita_2007	mean_GPD_per_capita_1952
Africa	3089.03	1252.57
Americas	11003.03	4079.06
Asia	12473.03	5195.48
Europe	25054.48	5661.06
Oceania	29810.19	10298.09

(6)plot that summarizes GDP per capita for the countries in each continent, contrasting the years 1952 and 2007.

```
ggplot(table2,aes(x = continent,y=mean_GPD_per_capita_1952,color = continent)) +
  geom_point(size=4) +
  ggtitle("1952 GDP by Continent") +
  xlab("Continent") + ylab("Avg. GDP per Capita in 1952") +
  theme_classic()
```




```
ggplot(table1,aes(x = continent,y=mean_GPD_per_capita_2007)) +
  geom_point(size=4,color="darkgreen") +
  ggtitle("2007 GDP by Continent") +
  xlab("Continent") + ylab("Avg. GDP per Capita in 2007") +
  theme_classic()
```




```
unique1<-unique(data$country)
country<-double(length(unique1))
summary<-data.frame(matrix(double(142*3),nrow = 142))
colnames(summary)<-c("Country","GDP_change","Population_change")
```

```
##                     Country  GDP_change Population_change
## 1               Afghanistan  0.25035114       2.785004462
## 2                   Albania  2.70819573       1.806994169
## 3                   Algeria  1.54117871       2.592125243
## 4                    Angola  0.36261355       1.934829204
## 5                 Argentina  1.16185054       1.254406567
## 6                 Australia  2.42995562       1.351130774
## 7                   Austria  4.88659645       0.183610402
## 8                   Bahrain  2.01974180       4.882861342
## 9                Bangladesh  1.03327094       2.208752777
## 10                  Belgium  3.03837715       0.190348672
## 11                    Benin  0.35618150       3.647209510
## 12                  Bolivia  0.42759477       2.162731786
## 13 Bosnia and Herzegovina  6.64873642       0.631027589
## 14                 Botswana 13.76649937       2.705858813
## 15                   Brazil  3.29873875       2.356926736
## 16                 Bulgaria  3.36969732       0.006592256
## 17             Burkina Faso  1.24026001       2.204982171
## 18                  Burundi  0.26753664       2.430832207
## 19                 Cambodia  3.65107610       2.010726834
## 20                 Cameroon  0.74141005       2.532852126
```

```
## 21                    Canada  2.19510163       1.258290305
## 22  Central African Republic -0.34097874       2.382406838
## 23                      Chad  0.44575633       2.816943912
## 24                     Chile  2.34307354       1.553420171
## 25                     China 11.38389825       1.370608591
## 26                  Colombia  2.26781917       2.580954582
## 27                   Comoros -0.10593293       3.618542771
## 28          Congo, Dem. Rep. -0.64441152       3.582038021
## 29               Congo, Rep.  0.70893922       3.445755862
## 30                Costa Rica  2.67149853       3.462709850
## 31            Cote d'Ivoire  0.11245569       5.050820972
## 32                  Croatia  3.68679519       0.157405192
## 33                     Cuba  0.60172573       0.900361647
## 34           Czech Republic  2.32065776       0.120935766
## 35                  Denmark  2.63980773       0.261679742
## 36                 Djibouti -0.21990688       6.860362001
## 37       Dominican Republic  3.31086848       2.740797946
## 38                  Ecuador  0.95146118       2.876201020
## 39                    Egypt  2.93367121       2.611727803
## 40              El Salvador  0.87919433       2.397037004
## 41        Equatorial Guinea 31.35541662       1.540518243
## 42                  Eritrea  0.94980373       2.410287331
## 43                 Ethiopia  0.90753189       2.667710244
## 44                  Finland  4.16880470       0.280640508
## 45                   France  3.33440159       0.438633892
## 46                    Gabon  2.07594198       2.458188932
## 47                   Gambia  0.55132350       4.938235087
## 48                  Germany  3.50305981       0.191696601
## 49                    Ghana  0.45683140       3.098429296
## 50                   Greece  6.79972508       0.384448970
## 51                Guatemala  1.13572578       2.995996670
## 52                   Guinea  0.84762974       2.733815420
## 53            Guinea-Bissau  0.93173629       1.535147498
## 54                    Haiti -0.34706654       1.655894384
## 55                 Honduras  0.61660599       3.931792286
## 56         Hong Kong, China 12.00573037       2.283509102
## 57                  Hungary  2.42136406       0.047570286
## 58                  Iceland  3.97830769       1.040598262
## 59                    India  3.48657899       1.984936374
## 60                Indonesia  3.72287343       1.724455224
## 61                     Iran  2.82354794       3.021165470
## 62                     Iraq  0.08264290       4.053440005
## 63                  Ireland  6.80687291       0.391893247
## 64                   Israel  5.24572101       2.964848845
## 65                    Italy  4.79342492       0.219899572
## 66                  Jamaica  1.52572098       0.949471809
## 67                    Japan  8.84037850       0.474316556
## 68                   Jordan  1.92160990       8.957317976
## 69                    Kenya  0.71432822       4.508960951
## 70         Korea, Dem. Rep.  0.46384089       1.628363492
## 71              Korea, Rep. 21.65507069       1.341311553
## 72                   Kuwait -0.56351760      14.659743750
## 73                  Lebanon  1.16369858       1.724000697
## 74                  Lesotho  4.25130110       1.688022790
```

```
## 75                  Liberia -0.27983532       2.699655279
## 76                    Libya  4.05015982       4.920116031
## 77               Madagascar -0.27597946       3.024356108
## 78                   Malawi  1.05693862       3.567506294
## 79                 Malaysia  5.79997385       2.678111392
## 80                     Mali  1.30487800       2.134775497
## 81               Mauritania  1.42647408       2.197932436
## 82                Mauritius  4.56770210       1.421580622
## 83                   Mexico  2.44368680       2.606016053
## 84                 Mongolia  2.93580309       2.589683800
## 85               Montenegro  2.49522074       0.654615136
## 86                  Morocco  1.26286409       2.396361605
## 87               Mozambique  0.75803595       2.095047776
## 88                  Myanmar  1.85196375       1.377046211
## 89                  Namibia  0.98494069       3.230030607
## 90                    Nepal  0.99931912       2.147473639
## 91              Netherlands  3.11537635       0.596092482
## 92              New Zealand  1.38571767       1.063256156
## 93                Nicaragua -0.11664541       3.868248999
## 94                    Niger -0.18664698       2.815649386
## 95                  Nigeria  0.86949896       3.077139183
## 96                   Norway  3.88906670       0.390716429
## 97                     Oman 11.20644510       5.310927017
## 98                 Pakistan  2.80654171       3.093946800
## 99                   Panama  2.95471029       2.448826696
## 100                Paraguay  1.13738660       3.285140333
## 101                    Peru  0.97122771       2.572866790
## 102             Philippines  1.50650377       3.058939401
## 103                  Poland  2.81947516       0.496984693
## 104                Portugal  5.68432519       0.248272764
## 105             Puerto Rico  5.27156432       0.770314773
## 106                 Reunion  1.82105412       2.096988747
## 107                 Romania  2.43713995       0.339510283
## 108                  Rwanda  0.74953718       2.495401643
## 109    Sao Tome and Principe  0.81726344       2.325706954
## 110            Saudi Arabia  2.35237219       5.890480186
## 111                 Senegal  0.18072458       3.451858750
## 112                  Serbia  1.73255494       0.479598761
## 113            Sierra Leone -0.01960357       1.866937999
## 114               Singapore 19.36300861       3.039937001
## 115          Slovak Republic  2.68070327       0.530998385
## 116                Slovenia  5.11340508       0.348922940
## 117                 Somalia -0.18455541       2.608545568
## 118            South Africa  0.96170964       2.084334278
## 119                   Spain  6.51716289       0.416755698
## 120               Sri Lanka  2.66403142       1.552914796
## 121                   Sudan  0.61040178       3.972908287
## 122               Swaziland  2.93031392       2.903852978
## 123                  Sweden  2.97049310       0.267579298
## 124             Switzerland  1.54552916       0.568984631
## 125                   Syria  1.54614261       4.275020763
## 126                  Taiwan 22.79413107       1.710328990
## 127                Tanzania  0.54535976       3.582480318
## 128                Thailand  8.84220341       2.056363396
```

```
## 129                    Togo  0.02693772       3.676825692
## 130      Trinidad and Tobago  4.95662900       0.594037867
## 131                 Tunisia  3.83012648       1.817133920
## 132                  Turkey  3.29550159       2.200201505
## 133                  Uganda  0.43773408       4.007968175
## 134          United Kingdom  2.32714395       0.205160381
## 135           United States  2.07006241       0.911356477
## 136                 Uruguay  0.85620010       0.530203976
## 137               Venezuela  0.48453875       3.795355440
## 138                 Vietnam  3.03521999       2.248480931
## 139       West Bank and Gaza  0.99615011       2.899078679
## 140             Yemen, Rep.  1.91763928       3.474719617
## 141                  Zambia  0.10791700       3.395971183
## 142                Zimbabwe  0.15440559       2.995947622
```

```
negative_gro <- filter(summary1,Population_change<0)
negative_gro
```

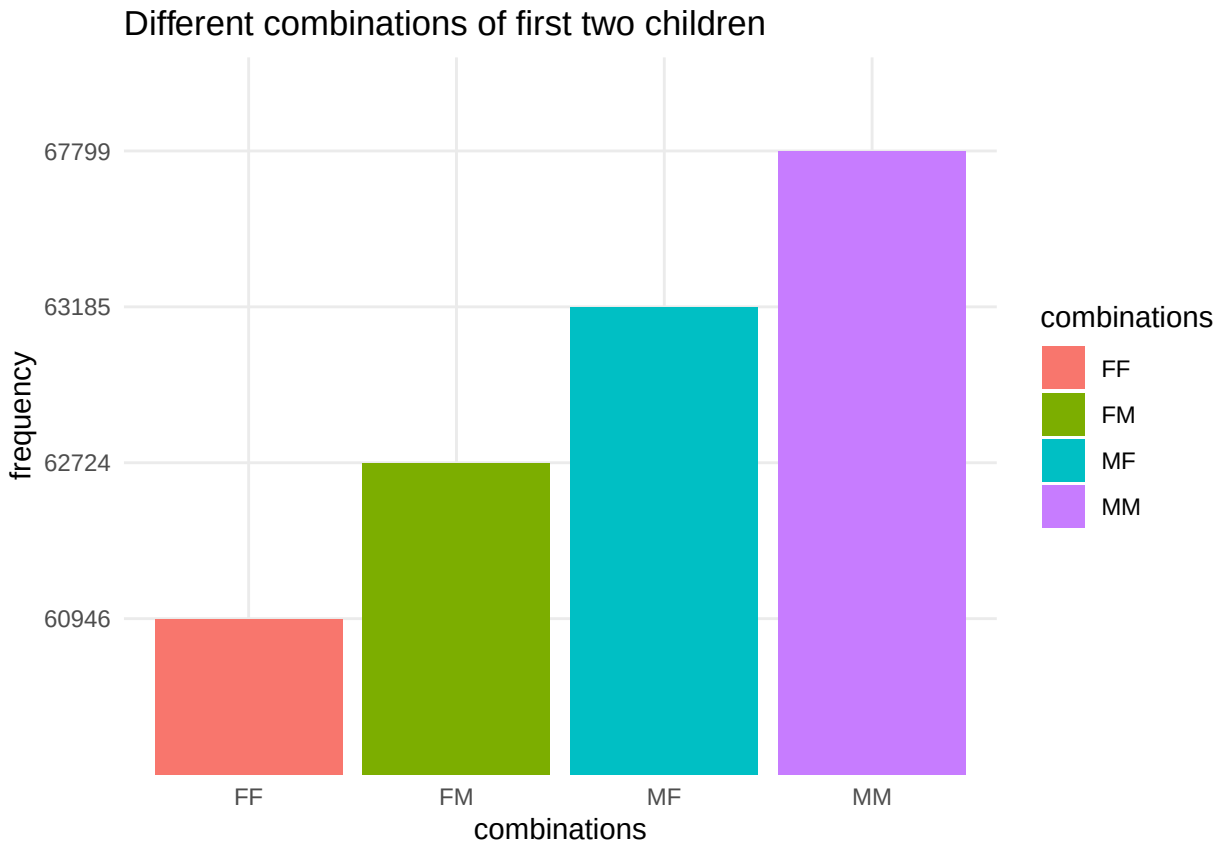
```
## [1] Country           GDP_change        Population_change
## <0 rows> (or 0-length row.names)
```

```
max_gdp<-filter(summary,GDP_change==max(GDP_change))
max_gdp
```

```
##             Country GDP_change Population_change
## 1 Equatorial Guinea   31.35542          1.540518
```

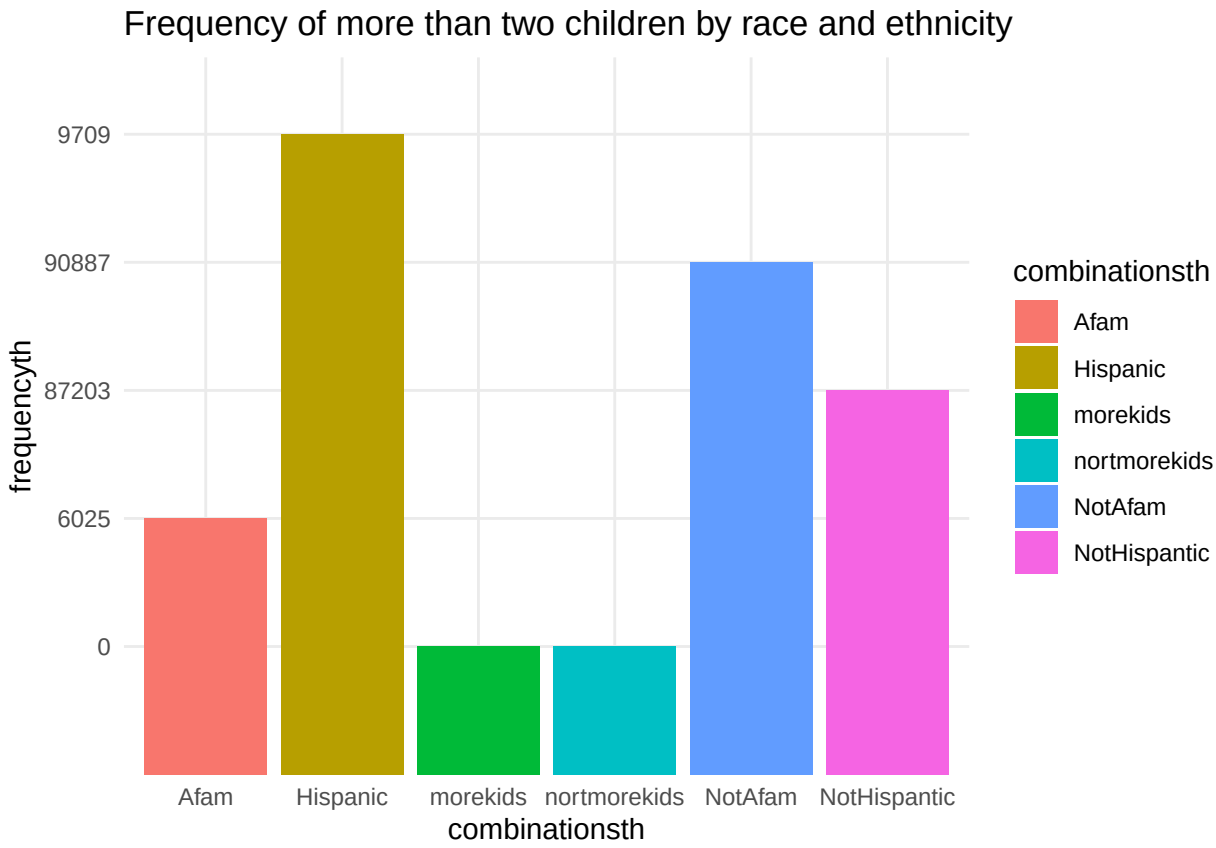
Question 2

```
#d<-data("GSS7402", package = "AER")
data('Fertility')
data2<-Fertility
MM<-data2[data2$gender1=='male' & data2$gender2=='male',]
MF<-data2[data2$gender1=='male' & data2$gender2=='female',]
FF<-data2[data2$gender1=='female' & data2$gender2=='female',]
FM<-data2[data2$gender1=='female' & data2$gender2=='male',]
frequency<-c(nrow(MM),nrow(MF),nrow(FF),nrow(FM))
combinations<-c("MM","MF","FF","FM")
da<-data.frame(cbind(frequency,combinations))
ggplot(da,aes(y=frequency,x=combinations,fill=combinations))+
  geom_bar(stat="identity")+theme_minimal()+
  ggtitle("Different combinations of first two children")
```




```
Hispanic<-data2[data2$morekids=='yes' & data2$hispanic=='yes',]
NotHispanic<-data2[data2$morekids=='yes' & data2$hispanic=='no',]
Afam<-data2[data2$morekids=='yes' & data2$afam =='yes',]
NotAfam<-data2[data2$morekids=='yes' & data2$afam =='no',]
notmorekids<-data2[data2$morekids=='yes' & data2$work =='yes',]
morekids<-data2[data2$morekids=='yes' & data2$work =='no',]


frequencyth<-c(nrow(Hispanic),nrow(NotHispanic),nrow(Afam),nrow(NotAfam),nrow(notmorekids),nrow(morekids
combinationsth<-c("Hispanic","NotHispantic","Afam","NotAfam","nortmorekids","morekids")
dat<-data.frame(cbind(frequencyth,combinationsth))
ggplot(dat,aes(y=frequencyth,x=combinationsth,fill=combinationsth))+
  geom_bar(stat="identity")+theme_minimal()+
  ggtitle("Frequency of more than two children by race and ethnicity")
```




```
twoMM<-data2[data2$gender1=='male' & data2$gender2=='male'& data2$age<29,]
twoMF<-data2[data2$gender1=='male' & data2$gender2=='female'& data2$age<29,]
twoFF<-data2[data2$gender1=='female' & data2$gender2=='female'& data2$age<29,]
twoFM<-data2[data2$gender1=='female' & data2$gender2=='male'& data2$age<29,]
frequency1<-c(nrow(twoMM),nrow(twoMF),nrow(twoFF),nrow(twoFM))
combinations1<-c("twoMM","twoMF","twoFF","twoFM")
da<-data.frame(cbind(frequency1,combinations1))

thirMM<-data2[data2$gender1=='male' & data2$gender2=='male'& data2$age>29,]
thirMF<-data2[data2$gender1=='male' & data2$gender2=='female'& data2$age>29,]
thirFF<-data2[data2$gender1=='female' & data2$gender2=='female'& data2$age>29,]
thirFM<-data2[data2$gender1=='female' & data2$gender2=='male'& data2$age>29,]
nrow(twoMM)==nrow(thirMM)
```

```
## [1] FALSE
```

```
nrow(twoMF)==nrow(thirMF)
```

```
## [1] FALSE
```

```
nrow(twoFF)==nrow(thirFF)
```

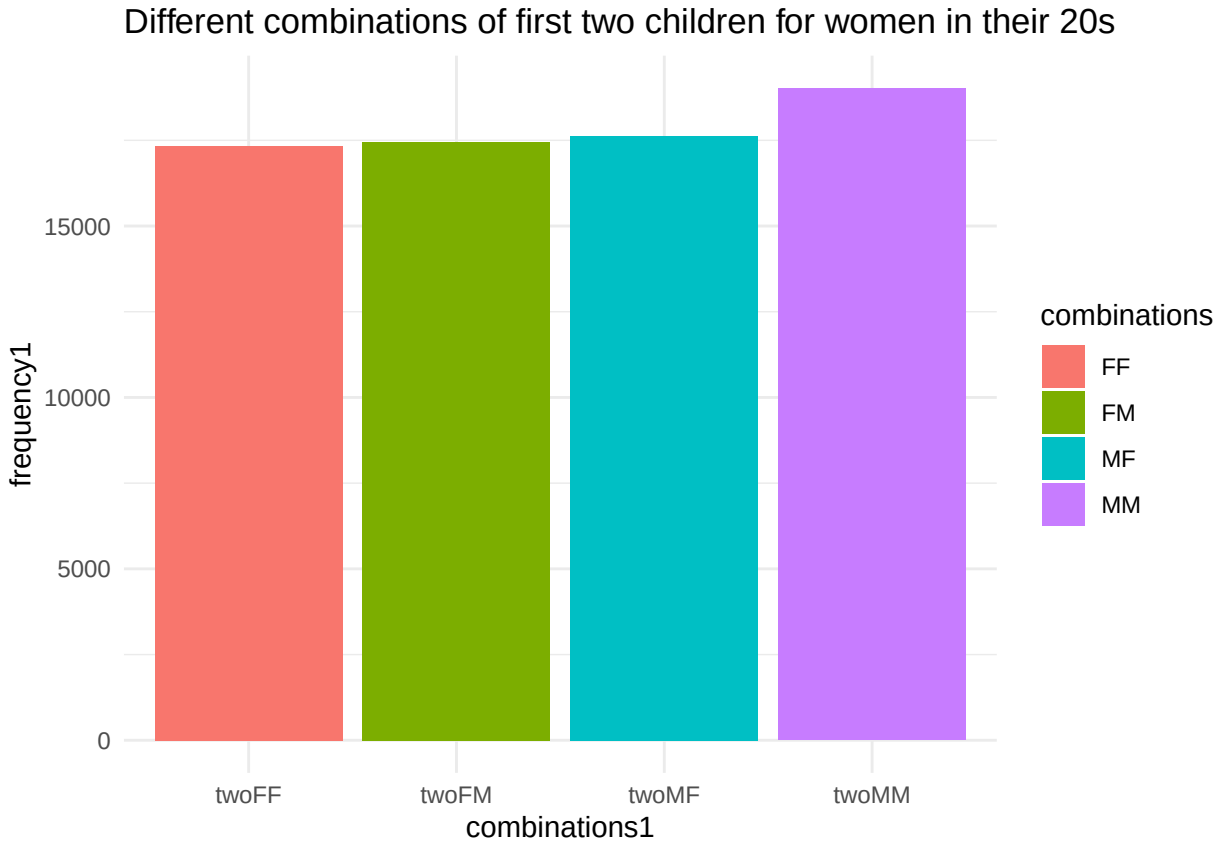
```
## [1] FALSE
```

```r
nrow(twoFM)==nrow(thirFM)
```

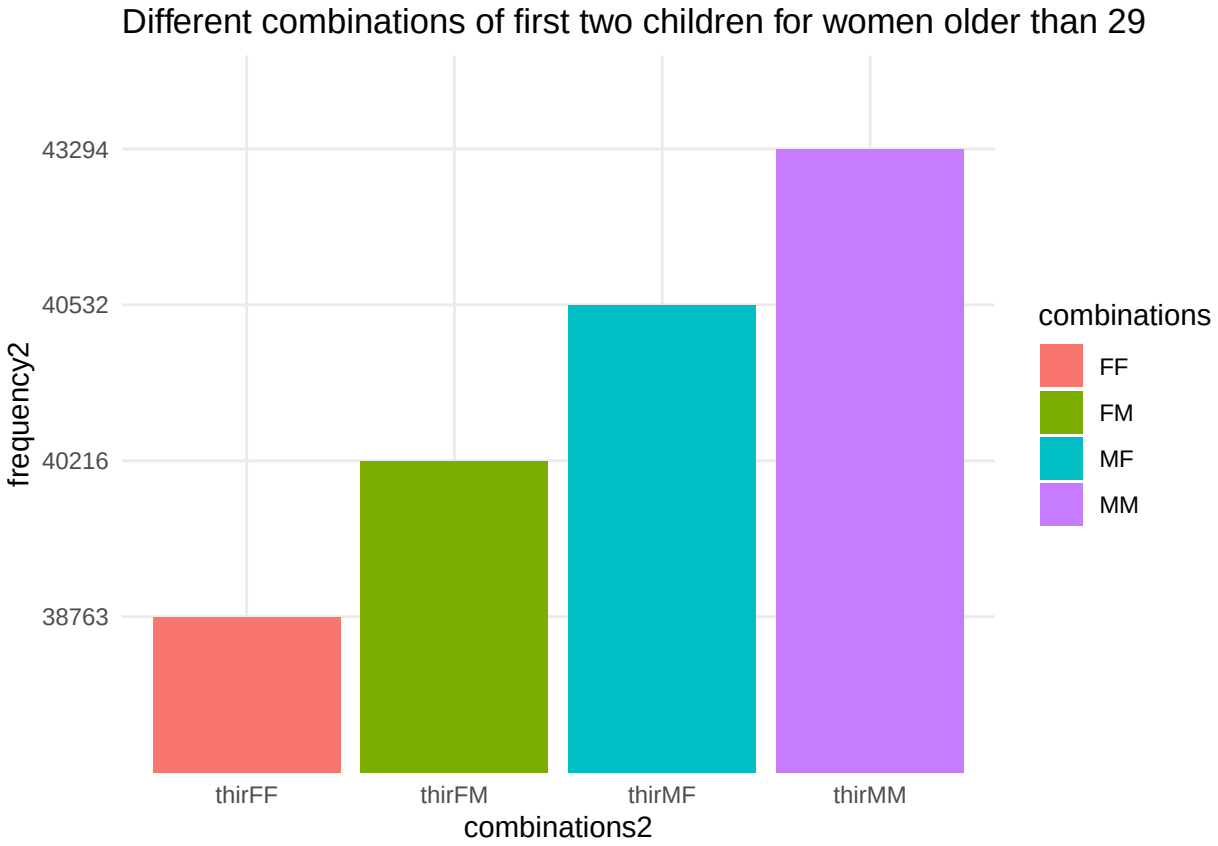
```
## [1] FALSE
```

```r
frequency2<-c(nrow(thirMM),nrow(thirMF),nrow(thirFF),nrow(thirFM))
combinations2<-c("thirMM","thirMF","thirFF","thirFM")
da<-data.frame(cbind(frequency2,combinations2))

par(mfrow=c(1,2))
ggplot(da,aes(y=frequency1,x=combinations1,fill=combinations))+
  geom_bar(stat="identity")+theme_minimal()+
  ggtitle("Different combinations of first two children for women in their 20s")
```




```r
ggplot(da,aes(y=frequency2,x=combinations2,fill=combinations))+
  geom_bar(stat="identity")+theme_minimal()+
  ggtitle("Different combinations of first two children for women older than 29")
```



Question 3

```
library(knitr)
datt<-mtcars
dattt<-mpg
carname<-rownames(datt)
library(stringr)
sum(str_count(carname,'e'))
```

```
## [1] 25
```

```
sum(str_count(carname,'Merc'))
```

```
## [1] 7
```

```
sum(str_count(dattt$manufacturer,'mercury'))
```

```
## [1] 4
```

```
#mercmtcars<-mtcars[mtcars$]

# [1] 3 4 3 3 2 3 1 1 2 2
mtcarsmerc<-datt[which(str_count(carname,'Merc') %in% c(1)),]
mtcarsmerc
```

```
##              mpg cyl  disp  hp drat   wt qsec vs am gear carb
## Merc 240D   24.4   4 146.7  62 3.69 3.19 20.0  1  0    4    2
## Merc 230    22.8   4 140.8  95 3.92 3.15 22.9  1  0    4    2
## Merc 280    19.2   6 167.6 123 3.92 3.44 18.3  1  0    4    4
## Merc 280C   17.8   6 167.6 123 3.92 3.44 18.9  1  0    4    4
## Merc 450SE  16.4   8 275.8 180 3.07 4.07 17.4  0  0    3    3
## Merc 450SL  17.3   8 275.8 180 3.07 3.73 17.6  0  0    3    3
## Merc 450SLC 15.2   8 275.8 180 3.07 3.78 18.0  0  0    3    3
```

```
mpgmerc<-dattt[which(str_count(dattt$manufacturer,'mercury') %in% c(1)),]
mpgmerc
```

```
## # A tibble: 4 x 11
##   manufacturer model  displ  year   cyl trans drv     cty   hwy fl    class
##   <chr>        <chr>  <dbl> <int> <int> <chr> <chr> <int> <int> <chr> <chr>
## 1 mercury      mount~   4    1999     6 auto~ 4        14    17 r     suv
## 2 mercury      mount~   4    2008     6 auto~ 4        13    19 r     suv
## 3 mercury      mount~   4.6  2008     8 auto~ 4        13    19 r     suv
## 4 mercury      mount~   5    1999     8 auto~ 4        13    17 r     suv
```

```
l<-data.frame(unclass(summary(mtcarsmerc$mpg)), check.names = FALSE, stringsAsFactors = FALSE)
table<-knitr::kable(l)
table
```

	unclass(summary(mtcarsmerc$mpg))
Min.	15.20000
1st Qu.	16.85000
Median	17.80000
Mean	19.01429
3rd Qu.	21.00000
Max.	24.40000

```
#colnames(table)<-c('summary','v')
```

Question 4

```
library(babynames)
baby_names<-babynames
```

```
sample<-baby_names[sample(nrow(baby_names), 500000), ]
```

five most popular boy names and girl names in year 1880

```
## # A tibble: 271 x 3
## # Groups:   sex_f [1]
##    sex_f name_f   total_f
##    <chr> <chr>      <int>
##  1 M     John        9655
##  2 M     George      5126
```

```
##  3 M     Frank       3242
##  4 M     Robert      2415
##  5 M     Harry       2152
##  6 M     Samuel      1024
##  7 M     Jesse        569
##  8 M     Oscar        544
##  9 M     Lewis        517
## 10 M     Benjamin     490
## # ... with 261 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f total_f
##   <chr> <chr>    <int>
## 1 M     John      9655
## 2 M     George    5126
## 3 M     Frank     3242
## 4 M     Robert    2415
## 5 M     Harry     2152
```

```
## # A tibble: 241 x 3
## # Groups:   sex [1]
##    sex   name     total
##    <chr> <chr>    <int>
##  1 F     Alice     1414
##  2 F     Sarah     1288
##  3 F     Clara     1226
##  4 F     Nellie     995
##  5 F     Grace      982
##  6 F     Carrie     949
##  7 F     Mabel      808
##  8 F     Bessie     796
##  9 F     Gertrude   787
## 10 F     Louise     635
## # ... with 231 more rows
```

```
## # A tibble: 241 x 3
## # Groups:   sex_m [1]
##    sex_m name_m   total_m
##    <chr> <chr>      <int>
##  1 F     Alice       1414
##  2 F     Sarah       1288
##  3 F     Clara       1226
##  4 F     Nellie       995
##  5 F     Grace        982
##  6 F     Carrie       949
##  7 F     Mabel        808
##  8 F     Bessie       796
##  9 F     Gertrude     787
## 10 F     Louise       635
## # ... with 231 more rows
```

```
## # A tibble: 5 x 3
```

Table 2: Most popular boy and girl names in 1880

sex_f	name_f	total_f	sex_m	name_m	total_m
M	John	9655	F	Alice	1414
M	George	5126	F	Sarah	1288
M	Frank	3242	F	Clara	1226
M	Robert	2415	F	Nellie	995
M	Harry	2152	F	Grace	982

```
## # Groups:   sex_m [1]
##   sex_m name_m total_m
##   <chr> <chr>    <int>
## 1 F     Alice     1414
## 2 F     Sarah     1288
## 3 F     Clara     1226
## 4 F     Nellie     995
## 5 F     Grace      982
```

```
new_table1<-data.frame(cbind(top5_1880_female,top5_1880_male))
new_table1
```

```
##   sex_f name_f total_f sex_m name_m total_m
## 1     M   John    9655     F  Alice    1414
## 2     M George    5126     F  Sarah    1288
## 3     M  Frank    3242     F  Clara    1226
## 4     M Robert    2415     F Nellie     995
## 5     M  Harry    2152     F  Grace     982
```

```
kable_2<-kable(new_table1, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the ta
      col.names = c("sex_f", "name_f", "total_f","sex_m","name_m","total_m"),
      caption = "Most popular boy and girl names in 1880" )
kable_2
```

five most popular boy names and girl names in year 1920

```
## # A tibble: 1,339 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     John      56913
##  2 M     Thomas    14938
##  3 M     Donald    11941
##  4 M     Arthur    10236
##  5 M     Eugene     6866
##  6 M     Earl       6532
##  7 M     Roy        6353
##  8 M     Francis    6241
##  9 M     Joe        6071
## 10 M     Stanley    5314
## # ... with 1,329 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f total_f
##   <chr> <chr>    <int>
## 1 M     John     56913
## 2 M     Thomas   14938
## 3 M     Donald   11941
## 4 M     Arthur   10236
## 5 M     Eugene    6866
```

```
## # A tibble: 1,485 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Evelyn    13838
##  2 F     Lucille    7988
##  3 F     Ethel      7868
##  4 F     Thelma     7815
##  5 F     Pauline    7180
##  6 F     Grace      7173
##  7 F     Beatrice   5804
##  8 F     Katherine  5276
##  9 F     Barbara    5106
## 10 F     Rita       4979
## # ... with 1,475 more rows
```

```
## # A tibble: 241 x 3
## # Groups:   sex_m [1]
##    sex_m name_m   total_m
##    <chr> <chr>      <int>
##  1 F     Alice       1414
##  2 F     Sarah       1288
##  3 F     Clara       1226
##  4 F     Nellie       995
##  5 F     Grace        982
##  6 F     Carrie       949
##  7 F     Mabel        808
##  8 F     Bessie       796
##  9 F     Gertrude     787
## 10 F     Louise       635
## # ... with 231 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m total_m
##   <chr> <chr>    <int>
## 1 F     Alice     1414
## 2 F     Sarah     1288
## 3 F     Clara     1226
## 4 F     Nellie     995
## 5 F     Grace      982
```

Table 3: Most five popular boy and girl names in 1920

sex_f	name_f	total_f	sex_m	name_m	total_m
M	John	56913	F	Alice	1414
M	Thomas	14938	F	Sarah	1288
M	Donald	11941	F	Clara	1226
M	Arthur	10236	F	Nellie	995
M	Eugene	6866	F	Grace	982

```
new_table2<-data.frame(cbind(top5_1920_female,top5_1920_male))
new_table2
```

```
##   sex_f name_f total_f sex_m name_m total_m
## 1     M   John   56913     F  Alice    1414
## 2     M Thomas   14938     F  Sarah    1288
## 3     M Donald   11941     F  Clara    1226
## 4     M Arthur   10236     F Nellie     995
## 5     M Eugene    6866     F  Grace     982
```

```
kable_3<-kable(new_table2, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the ta
      col.names = c("sex_f", "name_f", "total_f","sex_m","name_m","total_m"),
      caption = "Most five popular boy and girl names in 1920" )
kable_3
```

five most popular boy names and girl names in year 1960

```
## # A tibble: 1,243 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     Thomas    39279
##  2 M     Kenneth   27683
##  3 M     Paul      25639
##  4 M     Ronald    21700
##  5 M     Stephen   16259
##  6 M     Dennis    14314
##  7 M     Ricky     10994
##  8 M     Craig     10718
##  9 M     Steve     10655
## 10 M     Alan       8357
## # ... with 1,233 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f  total_f
##   <chr> <chr>     <int>
## 1 M     Thomas    39279
## 2 M     Kenneth   27683
## 3 M     Paul      25639
## 4 M     Ronald    21700
## 5 M     Stephen   16259
```

```
## # A tibble: 1,860 x 3
## # Groups:   sex [1]
##    sex   name     total
##    <chr> <chr>    <int>
##  1 F     Debra    26737
##  2 F     Brenda   23959
##  3 F     Nancy    21896
##  4 F     Sharon   20424
##  5 F     Diane    17900
##  6 F     Julie    16079
##  7 F     Denise   15065
##  8 F     Margaret 11367
##  9 F     Laurie   10145
## 10 F     Janice    9624
## # ... with 1,850 more rows
```

```
## # A tibble: 1,860 x 3
## # Groups:   sex_m [1]
##    sex_m name_m   total_m
##    <chr> <chr>      <int>
##  1 F     Debra      26737
##  2 F     Brenda     23959
##  3 F     Nancy      21896
##  4 F     Sharon     20424
##  5 F     Diane      17900
##  6 F     Julie      16079
##  7 F     Denise     15065
##  8 F     Margaret   11367
##  9 F     Laurie     10145
## 10 F     Janice      9624
## # ... with 1,850 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m total_m
##   <chr> <chr>    <int>
## 1 F     Debra    26737
## 2 F     Brenda   23959
## 3 F     Nancy    21896
## 4 F     Sharon   20424
## 5 F     Diane    17900
```

```
new_table3<-data.frame(cbind(top5_1960_female,top5_1960_male))
new_table3
```

```
##   sex_f  name_f total_f sex_m name_m total_m
## 1     M  Thomas   39279     F  Debra   26737
## 2     M Kenneth   27683     F Brenda   23959
## 3     M    Paul   25639     F  Nancy   21896
## 4     M  Ronald   21700     F Sharon   20424
## 5     M Stephen   16259     F  Diane   17900
```

Table 4: Most five popular boy and girl names in 1960

sex_f	name_f	total_f	sex_m	name_m	total_m
M	Thomas	39279	F	Debra	26737
M	Kenneth	27683	F	Brenda	23959
M	Paul	25639	F	Nancy	21896
M	Ronald	21700	F	Sharon	20424
M	Stephen	16259	F	Diane	17900

```
kable_4<-kable(new_table3, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the ta
      col.names = c("sex_f", "name_f", "total_f","sex_m","name_m","total_m"),
      caption = "Most five popular boy and girl names in 1960" )
kable_4
```

five most popular boy names and girl names in year 2000

```
sample4<-filter(sample,year==2000)%>%
  group_by(sex,name)%>%
  summarize(total=sum(n))%>%
  arrange(desc(total))
sample4_1<-filter(sample4,sex=="M")
sample4_1_1<- rename(sample4_1, sex_f = sex,name_f=name,total_f=total)
sample4_1_1
```

```
## # A tibble: 3,076 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     Ryan      20264
##  2 M     John      20092
##  3 M     Ethan     15223
##  4 M     Cameron   12761
##  5 M     Hunter    12535
##  6 M     Isaiah     8028
##  7 M     Charles    7524
##  8 M     Evan       7332
##  9 M     Richard    6352
## 10 M     Patrick    6294
## # ... with 3,066 more rows
```

```
top5_2000_female<-sample4_1_1[1:5,]
top5_2000_female
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f  total_f
##   <chr> <chr>     <int>
## 1 M     Ryan      20264
## 2 M     John      20092
## 3 M     Ethan     15223
## 4 M     Cameron   12761
## 5 M     Hunter    12535
```

```
## # A tibble: 4,490 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Hannah    23080
##  2 F     Madison   19967
##  3 F     Alexis    17629
##  4 F     Elizabeth 15094
##  5 F     Jennifer   9385
##  6 F     Amanda     8552
##  7 F     Sophia     6563
##  8 F     Allison    6314
##  9 F     Sierra     5521
## 10 F     Sara       5316
## # ... with 4,480 more rows
```

```
## # A tibble: 4,490 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Hannah      23080
##  2 F     Madison     19967
##  3 F     Alexis      17629
##  4 F     Elizabeth   15094
##  5 F     Jennifer     9385
##  6 F     Amanda       8552
##  7 F     Sophia       6563
##  8 F     Allison      6314
##  9 F     Sierra       5521
## 10 F     Sara         5316
## # ... with 4,480 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m    total_m
##   <chr> <chr>       <int>
## 1 F     Hannah      23080
## 2 F     Madison     19967
## 3 F     Alexis      17629
## 4 F     Elizabeth   15094
## 5 F     Jennifer     9385
```

```
new_table4<-data.frame(cbind(top5_2000_female,top5_2000_male))
new_table4
```

```
##   sex_f  name_f total_f sex_m    name_m total_m
## 1     M    Ryan   20264     F    Hannah   23080
## 2     M    John   20092     F   Madison   19967
## 3     M   Ethan   15223     F    Alexis   17629
## 4     M Cameron   12761     F Elizabeth   15094
## 5     M  Hunter   12535     F  Jennifer    9385
```

Table 5: Most five popular boy and girl names in 2000

sex_f	name_f	total_f	sex_m	name_m	total_m
M	Ryan	20264	F	Hannah	23080
M	John	20092	F	Madison	19967
M	Ethan	15223	F	Alexis	17629
M	Cameron	12761	F	Elizabeth	15094
M	Hunter	12535	F	Jennifer	9385

```
kable_5<-kable(new_table4, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the ta
      col.names = c("sex_f", "name_f", "total_f","sex_m","name_m","total_m"),
      caption = "Most five popular boy and girl names in 2000" )
kable_5
```

```
boyname<-subset(baby_names,baby_names$sex=="M",select = name)

girlname<-subset(baby_names,baby_names$sex=="F",select = name)
samename<-inner_join(boyname,girlname,by="name")
sharename<-unique(samename)
sharename
```

```
## # A tibble: 10,663 x 1
##    name
##    <chr>
##  1 John
##  2 William
##  3 James
##  4 Charles
##  5 George
##  6 Frank
##  7 Joseph
##  8 Thomas
##  9 Henry
## 10 Robert
## # ... with 10,653 more rows
```

```
#between 1801 and 2001
nineth_cen<-filter(sample,year>"1800"&year<"2002")
nineth_cen
name_in<-unique(nineth_cen$name)
name_in
```

```
newdata<-filter(sample,year>1880&year<2017)
newdata
```

```
## # A tibble: 491,105 x 5
##     year sex   name          n       prop
##    <dbl> <chr> <chr>     <int>      <dbl>
##  1  1993 F     Taneshia     41 0.0000208
##  2  1985 F     Autumn     1221 0.000661
```

```
##  3  2015 M     Jahmier     13 0.00000638
##  4  1893 M     Winfield    19 0.000157
##  5  2007 M     Daigan       6 0.00000271
##  6  1929 M     Elgin       41 0.0000370
##  7  1924 F     Florie      17 0.0000131
##  8  1977 F     Cindia      11 0.00000669
##  9  1984 F     Talisha    111 0.0000616
## 10  1973 M     Bela         8 0.00000496
## # ... with 491,095 more rows
```

```
Donald <- sample[sample$name=="Donald",]
Donald
```

```
## # A tibble: 50 x 5
##     year sex   name       n      prop
##    <dbl> <chr> <chr>  <int>     <dbl>
##  1  1955 F     Donald    69 0.0000344
##  2  1912 M     Donald  2872 0.00636
##  3  1914 M     Donald  4836 0.00708
##  4  1948 M     Donald 26442 0.0148
##  5  1957 F     Donald    93 0.0000443
##  6  1925 F     Donald   105 0.0000831
##  7  1939 M     Donald 24055 0.0212
##  8  1966 F     Donald    82 0.0000467
##  9  1988 F     Donald    36 0.0000187
## 10  1957 M     Donald 27859 0.0127
## # ... with 40 more rows
```

```
c1<-sum(Donald$n)
c1
```

```
## [1] 349375
```

```
Hilary <- sample[sample$name=="Hilary",]
Hilary
```

```
## # A tibble: 48 x 5
##     year sex   name       n       prop
##    <dbl> <chr> <chr>  <int>      <dbl>
##  1  1944 M     Hilary    28 0.0000202
##  2  1934 M     Hilary    33 0.0000311
##  3  1962 F     Hilary   200 0.0000987
##  4  1992 F     Hilary  1170 0.000584
##  5  1976 M     Hilary    11 0.00000674
##  6  1982 M     Hilary     6 0.00000318
##  7  1959 F     Hilary   146 0.0000702
##  8  1956 M     Hilary    36 0.0000168
##  9  2013 F     Hilary    66 0.0000343
## 10  1968 M     Hilary    11 0.00000619
## # ... with 38 more rows
```

```
c2<-sum(Hilary$n)
```

```
Hillary <- sample[sample$name=="Hillary",]
Hillary
```

```
## # A tibble: 45 x 5
##     year sex   name        n       prop
##    <dbl> <chr> <chr>   <int>      <dbl>
##  1  2017 F     Hillary    63 0.0000336
##  2  2012 F     Hillary   157 0.0000811
##  3  1997 F     Hillary   294 0.000154
##  4  1967 M     Hillary     8 0.00000449
##  5  1994 M     Hillary     7 0.00000343
##  6  1911 M     Hillary     9 0.0000373
##  7  2010 F     Hillary   168 0.0000858
##  8  1945 F     Hillary    19 0.0000141
##  9  1960 F     Hillary    75 0.0000361
## 10  1947 F     Hillary    51 0.0000281
## # ... with 35 more rows
```

```
c3<-sum(Hillary$n)
c3
```

```
## [1] 6232
```

```
Joe <- sample[sample$name=="Joe",]
Joe
```

```
## # A tibble: 72 x 5
##     year sex   name      n      prop
##    <dbl> <chr> <chr> <int>     <dbl>
##  1  2014 M     Joe     488 0.000239
##  2  1916 F     Joe     101 0.0000930
##  3  1898 F     Joe      20 0.0000730
##  4  1893 M     Joe     721 0.00596
##  5  1902 F     Joe      30 0.000107
##  6  1905 F     Joe      28 0.0000904
##  7  1964 M     Joe    5817 0.00287
##  8  1896 M     Joe     767 0.00594
##  9  1888 F     Joe      24 0.000127
## 10  1990 M     Joe    1459 0.000678
## # ... with 62 more rows
```

```
c4<-sum(Joe$n)
c4
```

```
## [1] 163681
```

```
Barrack <- sample[sample$name=="Barrack",]
Barrack
```

```
## # A tibble: 0 x 5
## # ... with 5 variables: year <dbl>, sex <chr>, name <chr>, n <int>,
## #   prop <dbl>
```

```
c5<-sum(Barrack$n)
c5
```

```
## [1] 0
```

```
fren<-c(374245,4602,7750,113157,0)
fren
```

```
## [1] 374245   4602   7750 113157      0
```

```
Name<-c("Donald","Hilary","Hillary","Joe","Barrack")
frenquen<-data.frame(cbind(Name,fren))
```

```
ggplot(frenquen,aes(y=fren,x=Name))+
  geom_bar(stat="identity",color="darkgreen",fill="darkgreen")+theme_minimal()+
  ggtitle("Relative Frequency of the names over years 1880 through 2017")
```