Tidyverse_Yuanyuan Lin

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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
```

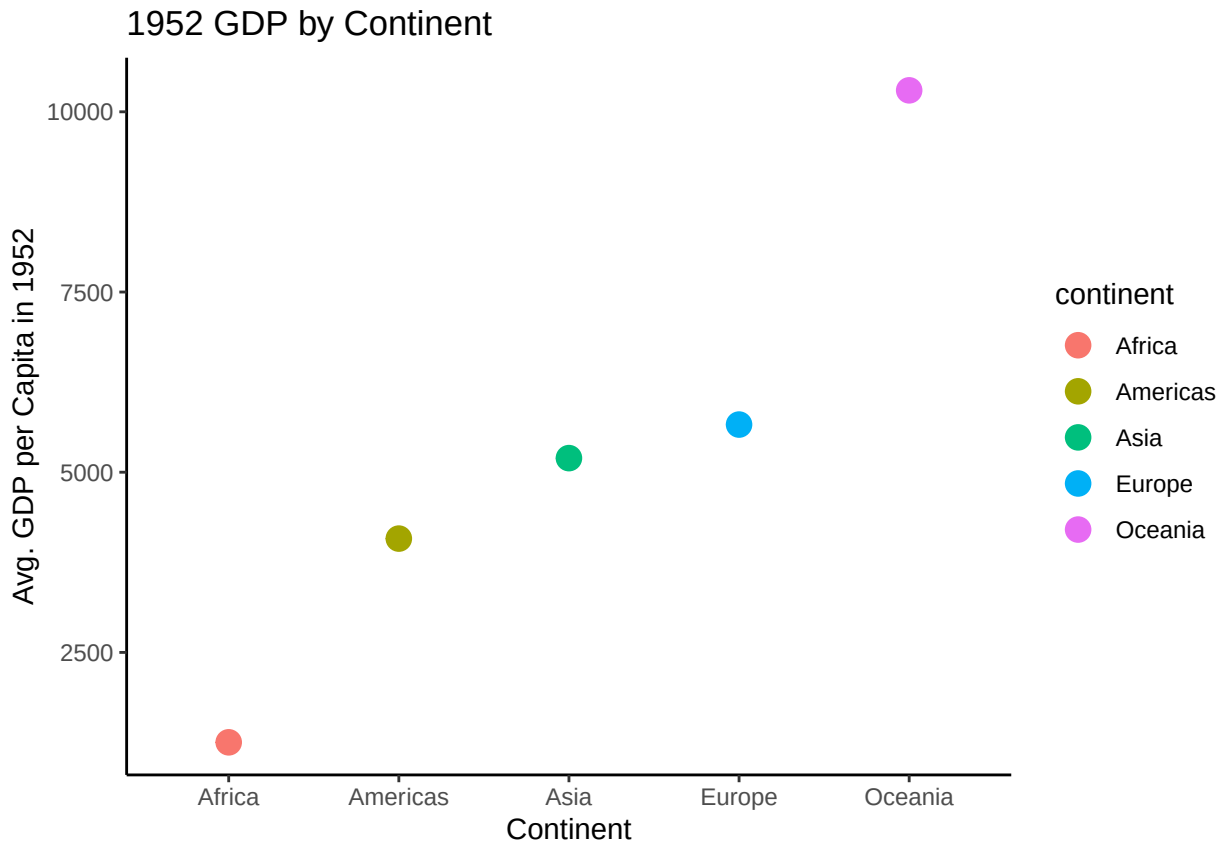
```
kable_1<-kable(new_table, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the tab
      col.names = c("continent", "mean_GPD_per_capita_2007", "mean_GPD_per_capita_1952"),
      caption = "Total population and GDP per capita by continent" )
kable_1
```

Table 1: Total population and GDP per capita by continent

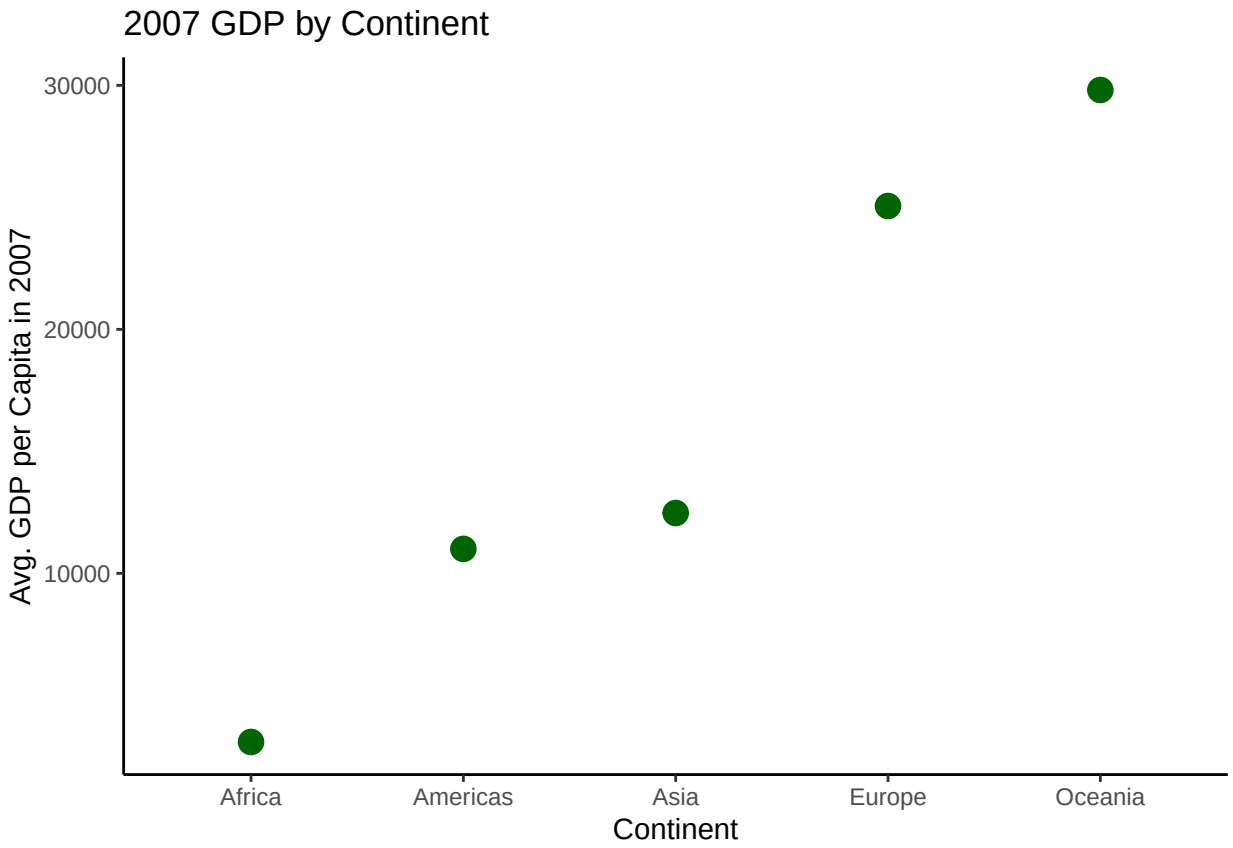
continent	mean_GPD_per_capita_2007	mean_GPD_per_capita_1952
Africa	3089.03	1252.57
Americas	11003.03	4079.06
Asia	12473.03	5195.48
Europe	25054.48	5661.06
Oceania	29810.19	10298.09

(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
```

```
nrow(data)
```

```
## [1] 1704
```

```
for(i in 1:nrow(data)){
  a=data$pop[i]
  b=data$pop[i+1]
  c <- (b-a)/a
  data$negative_check[i]<-c
}
```

```
## Warning: Unknown or uninitialised column: 'negative_check'.
```

```
country.unique<-unique(data$country)
for(p in 1:length(country.unique)){
  if(data$country[p]!=data$country[p+1]){
    data$negative_check[p]<-1
  }
}
```

```
getcountry<-rep(0,1703)
for(g in 1:length(getcountry)){
  if(data$negative_check[g]<0){
```

```
    getcountry<-data$country[g]
  }
}
getcountry
```

```
## [1] Zambia
## 142 Levels: Afghanistan Albania Algeria Angola Argentina ... Zimbabwe
```

```
getyear<-rep(0,1703)
for(g in 1:length(getyear)){
  if(data$negative_check[g]<0){
    getyear<-data$year[g]
  }
}
getyear
```

```
## [1] 2007
```

```
for(i in 1:1703){
  e=data$gdpPercap[i]
  f=data$gdpPercap[i+1]
  g <- (f-e)/e
  data$gdp_check[i]<-g
}
```

```
## Warning: Unknown or uninitialised column: 'gdp_check'.
```

```
for(p in 1:length(country.unique)){
  if(data$country[p]!=data$country[p+1]){
    data$gdp_check[p]<-0
  }
}
```

```
max(data$gdp_check,na.rm=TRUE)
```

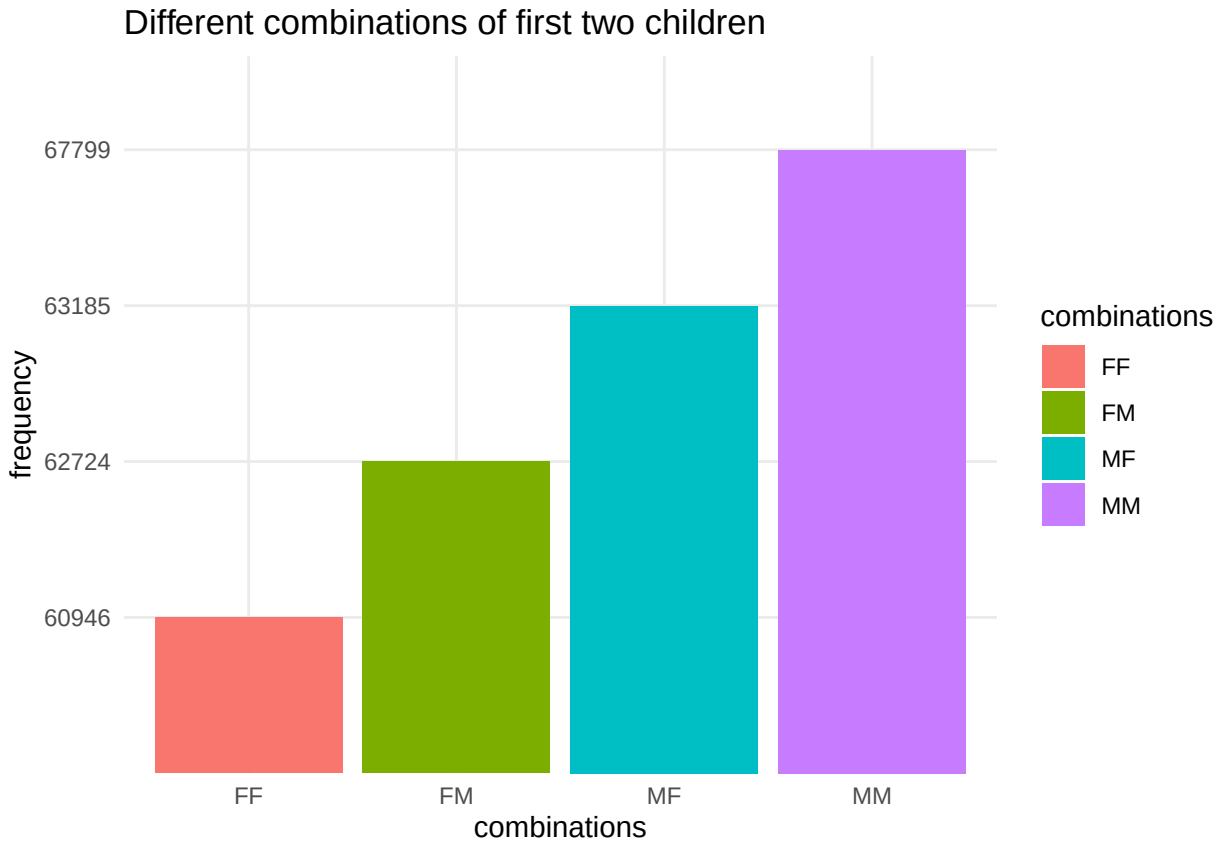
```
## [1] 8.49069
```

```
#mac_gdp_cou<-filter(data,gdp_check==8.49069)
#mac_gdp_cou
#answer is Gambia, Africa
```

Question 2

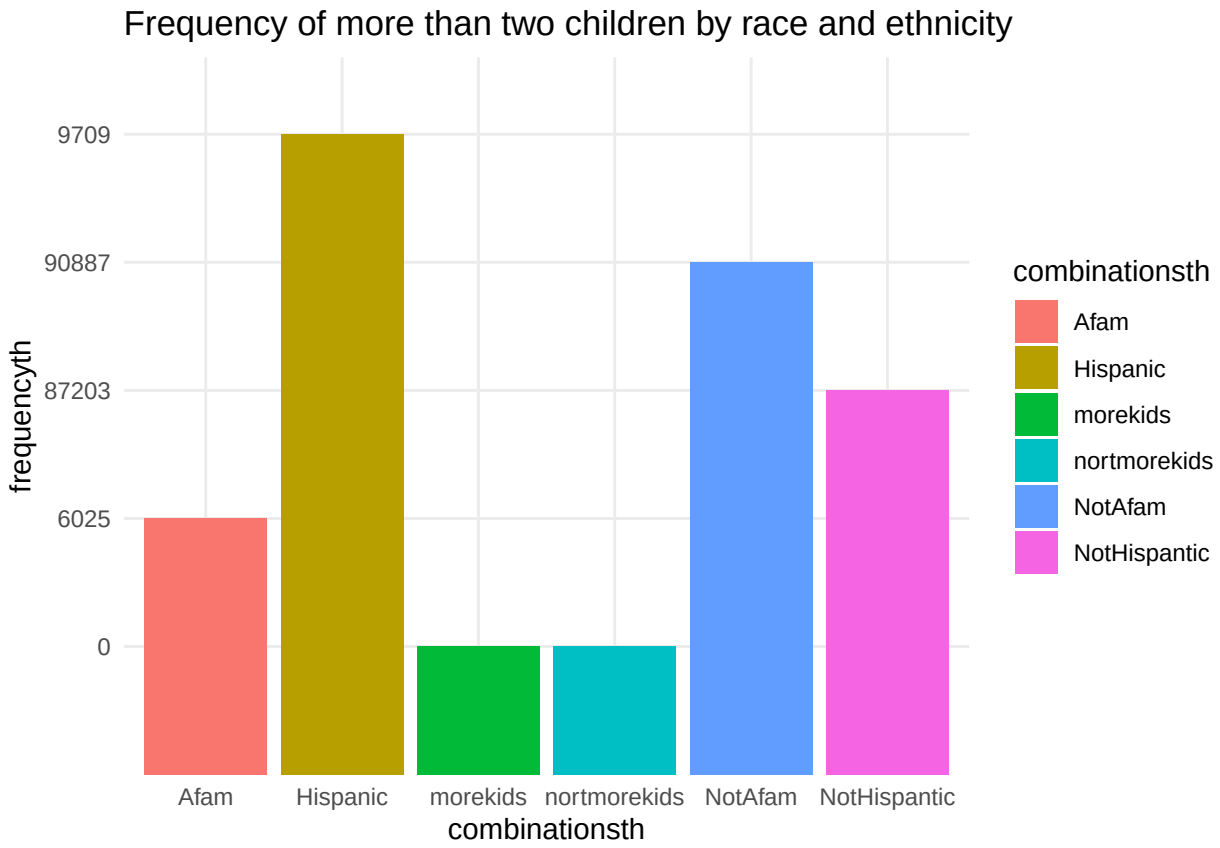
```
#d<-data("GSS7402", package = "AER")
data('Fertility')
data2<-Fertility
MM<-data2[data2$gender1=='male' & data2$gender2=='male',]
MF<-data2[data2$gender1=='male' & data2$gender2=='female',]
```

```
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)
```

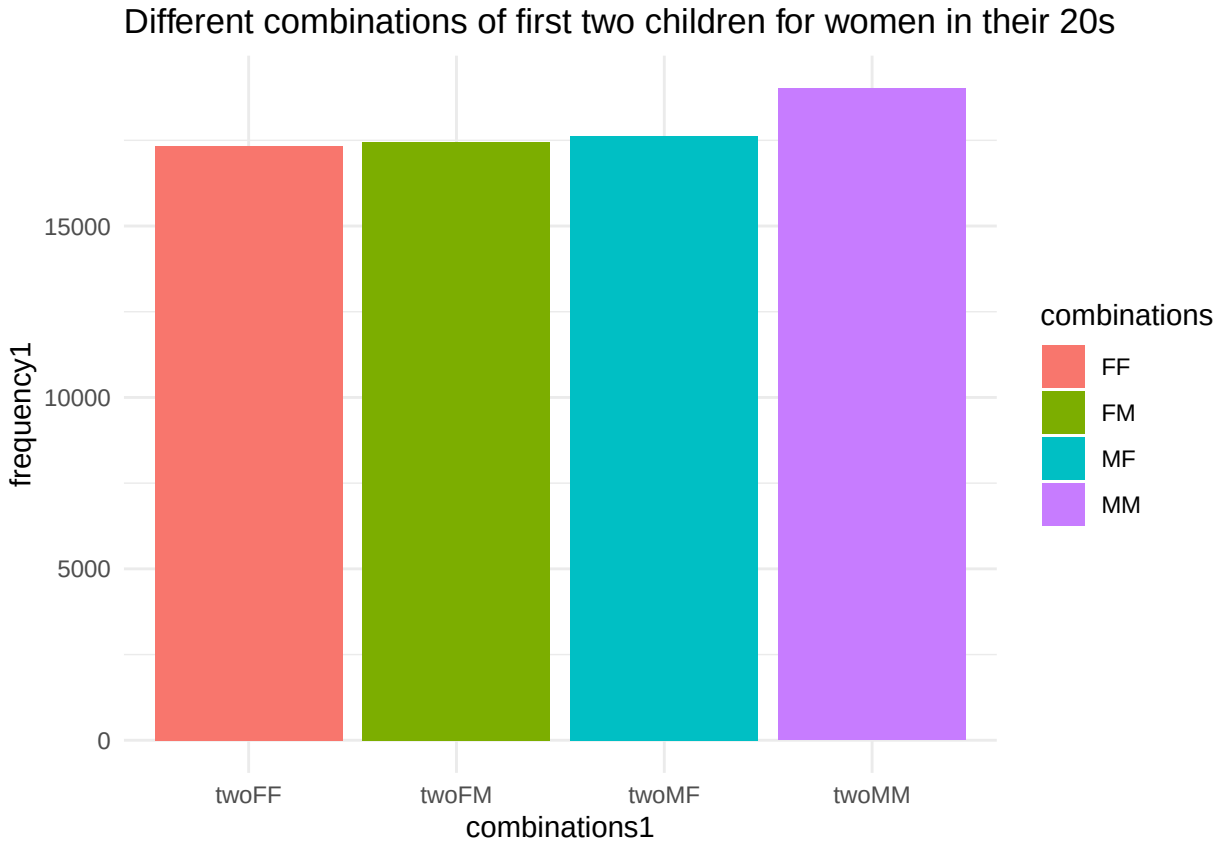
```
## [1] FALSE
```

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

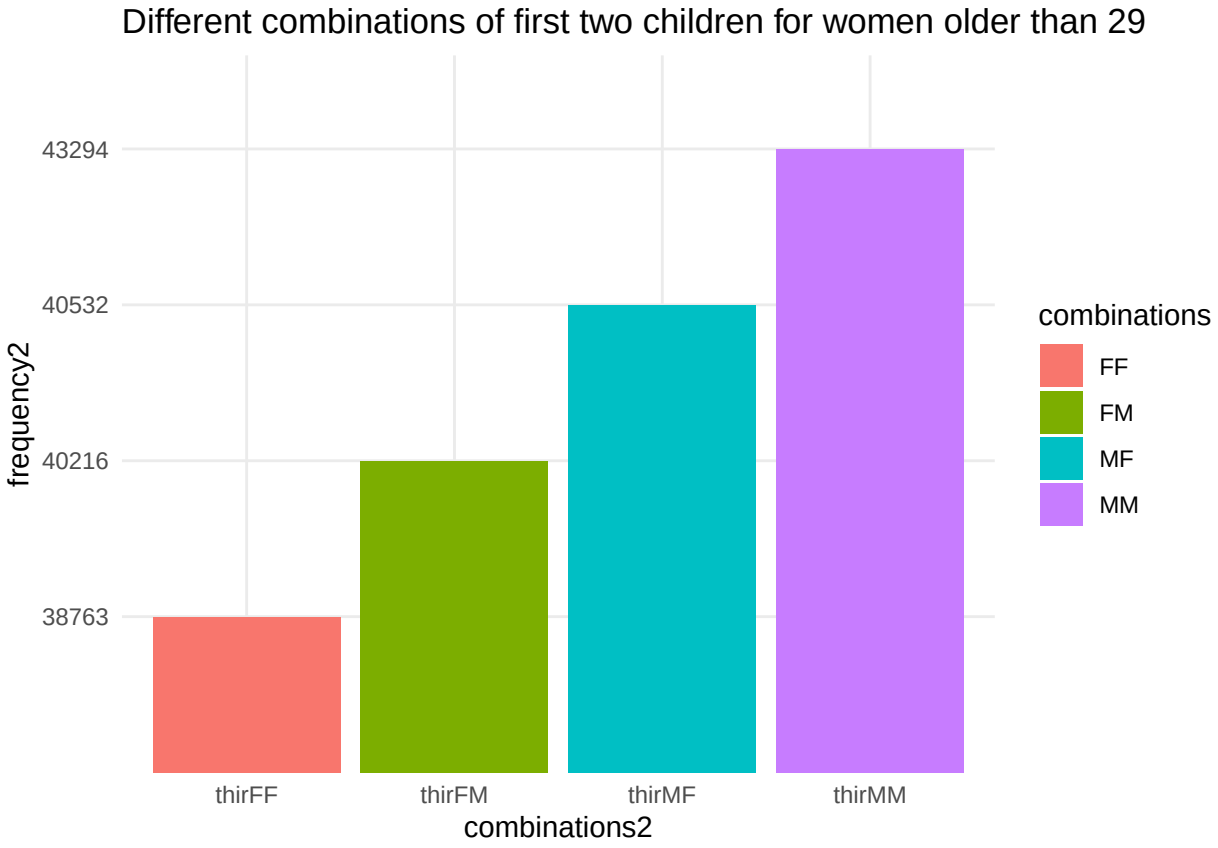
```
## [1] FALSE
```

```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: 266 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     William    9532
##  2 M     James      5927
```

```
##  3 M     Thomas     2534
##  4 M     Harry      2152
##  5 M     Louis       828
##  6 M     Daniel      643
##  7 M     Oscar       544
##  8 M     Willie      476
##  9 M     Alfred      469
## 10 M     Martin      357
## # ... with 256 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f  total_f
##   <chr> <chr>     <int>
## 1 M     William    9532
## 2 M     James      5927
## 3 M     Thomas     2534
## 4 M     Harry      2152
## 5 M     Louis       828
```

```
## # A tibble: 250 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Emma       2003
##  2 F     Sarah      1288
##  3 F     Cora       1045
##  4 F     Mabel       808
##  5 F     Gertrude    787
##  6 F     Julia       783
##  7 F     Hattie      769
##  8 F     Catherine   688
##  9 F     Lillie      647
## 10 F     Helen       636
## # ... with 240 more rows
```

```
## # A tibble: 250 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Emma         2003
##  2 F     Sarah        1288
##  3 F     Cora         1045
##  4 F     Mabel         808
##  5 F     Gertrude      787
##  6 F     Julia         783
##  7 F     Hattie        769
##  8 F     Catherine     688
##  9 F     Lillie        647
## 10 F     Helen         636
## # ... with 240 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	William	9532	F	Emma	2003
M	James	5927	F	Sarah	1288
M	Thomas	2534	F	Cora	1045
M	Harry	2152	F	Mabel	808
M	Louis	828	F	Gertrude	787

```
## # Groups:   sex_m [1]
##   sex_m name_m   total_m
##   <chr> <chr>      <int>
## 1 F     Emma        2003
## 2 F     Sarah       1288
## 3 F     Cora        1045
## 4 F     Mabel        808
## 5 F     Gertrude     787
```

```
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 William    9532     F     Emma    2003
## 2     M   James    5927     F    Sarah    1288
## 3     M  Thomas    2534     F     Cora    1045
## 4     M   Harry    2152     F    Mabel     808
## 5     M   Louis     828     F Gertrude     787
```

```
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: 1,307 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     George    26893
##  2 M     Joseph    25591
##  3 M     Edward    20095
##  4 M     Thomas    14938
##  5 M     Arthur    10236
##  6 M     Jack       9599
##  7 M     Kenneth    7840
##  8 M     David      7445
##  9 M     Carl       7010
## 10 M     Louis      6967
## # ... with 1,297 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f total_f
##   <chr> <chr>    <int>
## 1 M     George   26893
## 2 M     Joseph   25591
## 3 M     Edward   20095
## 4 M     Thomas   14938
## 5 M     Arthur   10236
```

```
## # A tibble: 1,532 x 3
## # Groups:   sex [1]
##    sex   name     total
##    <chr> <chr>    <int>
##  1 F     Mildred  18058
##  2 F     Virginia 17314
##  3 F     Betty    14017
##  4 F     Doris    11892
##  5 F     Florence 10732
##  6 F     Lillian  10049
##  7 F     Ruby      8337
##  8 F     Edna      8331
##  9 F     Lucille   7988
## 10 F     Ethel     7868
## # ... with 1,522 more rows
```

```
## # A tibble: 250 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Emma         2003
##  2 F     Sarah        1288
##  3 F     Cora         1045
##  4 F     Mabel         808
##  5 F     Gertrude      787
##  6 F     Julia         783
##  7 F     Hattie        769
##  8 F     Catherine     688
##  9 F     Lillie        647
## 10 F     Helen         636
## # ... with 240 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m   total_m
##   <chr> <chr>      <int>
## 1 F     Emma        2003
## 2 F     Sarah       1288
## 3 F     Cora        1045
## 4 F     Mabel        808
## 5 F     Gertrude     787
```

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

sex_f	name_f	total_f	sex_m	name_m	total_m
M	George	26893	F	Emma	2003
M	Joseph	25591	F	Sarah	1288
M	Edward	20095	F	Cora	1045
M	Thomas	14938	F	Mabel	808
M	Arthur	10236	F	Gertrude	787

```
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 George   26893     F     Emma    2003
## 2     M Joseph   25591     F    Sarah    1288
## 3     M Edward   20095     F     Cora    1045
## 4     M Thomas   14938     F    Mabel     808
## 5     M Arthur   10236     F Gertrude     787
```

```
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: 1,165 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     Mark      58731
##  2 M     Charles   29676
##  3 M     Gary      21684
##  4 M     Scott     21600
##  5 M     Edward    16586
##  6 M     George    14063
##  7 M     Mike      12047
##  8 M     Craig     10718
##  9 M     Danny      8603
## 10 M     Alan       8357
## # ... with 1,155 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f  total_f
##   <chr> <chr>     <int>
## 1 M     Mark      58731
## 2 M     Charles   29676
## 3 M     Gary      21684
## 4 M     Scott     21600
## 5 M     Edward    16586
```

```
## # A tibble: 1,884 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Donna     34133
##  2 F     Patricia  32102
##  3 F     Barbara   24444
##  4 F     Elizabeth 18858
##  5 F     Teresa    18835
##  6 F     Diane     17900
##  7 F     Carol     17460
##  8 F     Kimberly  16854
##  9 F     Kathleen  16084
## 10 F     Robin     13979
## # ... with 1,874 more rows
```

```
## # A tibble: 1,884 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Donna       34133
##  2 F     Patricia    32102
##  3 F     Barbara     24444
##  4 F     Elizabeth   18858
##  5 F     Teresa      18835
##  6 F     Diane       17900
##  7 F     Carol       17460
##  8 F     Kimberly    16854
##  9 F     Kathleen    16084
## 10 F     Robin       13979
## # ... with 1,874 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m    total_m
##   <chr> <chr>       <int>
## 1 F     Donna       34133
## 2 F     Patricia    32102
## 3 F     Barbara     24444
## 4 F     Elizabeth   18858
## 5 F     Teresa      18835
```

```
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    Mark   58731     F     Donna   34133
## 2     M Charles   29676     F  Patricia   32102
## 3     M    Gary   21684     F   Barbara   24444
## 4     M   Scott   21600     F Elizabeth   18858
## 5     M  Edward   16586     F    Teresa   18835
```

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

sex_f	name_f	total_f	sex_m	name_m	total_m
M	Mark	58731	F	Donna	34133
M	Charles	29676	F	Patricia	32102
M	Gary	21684	F	Barbara	24444
M	Scott	21600	F	Elizabeth	18858
M	Edward	16586	F	Teresa	18835

```
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: 3,113 x 3
## # Groups:   sex_f [1]
##    sex_f name_f      total_f
##    <chr> <chr>         <int>
##  1 M     Jacob         34471
##  2 M     Christopher   24931
##  3 M     William       20659
##  4 M     Brandon       20336
##  5 M     Ryan          20264
##  6 M     Alexander     17282
##  7 M     Dylan         15401
##  8 M     Ethan         15223
##  9 M     Robert        13737
## 10 M     Nathan        13036
## # ... with 3,103 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     Jacob         34471
## 2 M     Christopher   24931
## 3 M     William       20659
## 4 M     Brandon       20336
## 5 M     Ryan          20264
```

```
## # A tibble: 4,573 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Madison   19967
##  2 F     Taylor    15078
##  3 F     Kayla     13312
##  4 F     Brianna   12878
##  5 F     Megan     11434
##  6 F     Destiny    9850
##  7 F     Kaitlyn    8758
##  8 F     Katherine  8107
##  9 F     Stephanie  7030
## 10 F     Sophia     6563
## # ... with 4,563 more rows
```

```
## # A tibble: 4,573 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Madison     19967
##  2 F     Taylor      15078
##  3 F     Kayla       13312
##  4 F     Brianna     12878
##  5 F     Megan       11434
##  6 F     Destiny      9850
##  7 F     Kaitlyn      8758
##  8 F     Katherine    8107
##  9 F     Stephanie    7030
## 10 F     Sophia       6563
## # ... with 4,563 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m  total_m
##   <chr> <chr>     <int>
## 1 F     Madison   19967
## 2 F     Taylor    15078
## 3 F     Kayla     13312
## 4 F     Brianna   12878
## 5 F     Megan     11434
```

```
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       Jacob   34471     F Madison   19967
## 2     M Christopher   24931     F  Taylor   15078
## 3     M     William   20659     F   Kayla   13312
## 4     M     Brandon   20336     F Brianna   12878
## 5     M        Ryan   20264     F   Megan   11434
```

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

sex_f	name_f	total_f	sex_m	name_m	total_m
M	Jacob	34471	F	Madison	19967
M	Christopher	24931	F	Taylor	15078
M	William	20659	F	Kayla	13312
M	Brandon	20336	F	Brianna	12878
M	Ryan	20264	F	Megan	11434

```
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: 491,039 x 5
##     year sex   name         n       prop
##    <dbl> <chr> <chr>    <int>      <dbl>
##  1  1989 F     Cameron    271 0.000136
##  2  2000 F     Athziry     12 0.00000602
```

```
##  3  2015 M     Trayden     17 0.00000834
##  4  1915 M     Pershing    10 0.0000114
##  5  1993 F     Carolyn   1478 0.000750
##  6  1983 M     Susan       14 0.00000751
##  7  1962 M     Kirby      276 0.000131
##  8  2000 M     Lawrence   888 0.000425
##  9  1998 M     Ludwig       7 0.00000345
## 10  2008 M     Santana    173 0.0000794
## # ... with 491,029 more rows
```

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

```
## # A tibble: 54 x 5
##     year sex   name       n       prop
##    <dbl> <chr> <chr>  <int>      <dbl>
##  1  1900 M     Donald   328 0.00202
##  2  1919 F     Donald    42 0.0000358
##  3  1923 F     Donald    53 0.0000423
##  4  1945 F     Donald    47 0.0000349
##  5  2008 M     Donald   991 0.000455
##  6  1936 F     Donald    88 0.0000817
##  7  1976 F     Donald    58 0.0000369
##  8  1993 F     Donald    12 0.00000609
##  9  1885 M     Donald    47 0.000405
## 10  1987 F     Donald    42 0.0000224
## # ... with 44 more rows
```

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

```
## [1] 267033
```

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

```
## # A tibble: 55 x 5
##     year sex   name       n       prop
##    <dbl> <chr> <chr>  <int>      <dbl>
##  1  1961 F     Hilary   206 0.0000992
##  2  1985 M     Hilary    13 0.00000676
##  3  1969 M     Hilary    12 0.00000656
##  4  1990 F     Hilary  1216 0.000592
##  5  1996 F     Hilary   123 0.0000642
##  6  1882 M     Hilary     7 0.0000574
##  7  1914 F     Hilary     5 0.00000628
##  8  1927 F     Hilary     8 0.00000647
##  9  1999 F     Hilary    81 0.0000416
## 10  1918 M     Hilary    47 0.0000448
## # ... with 45 more rows
```

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

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

```
## # A tibble: 49 x 5
##     year sex   name        n       prop
##    <dbl> <chr> <chr>   <int>      <dbl>
##  1  1994 F     Hillary   408 0.000209
##  2  2010 F     Hillary   168 0.0000858
##  3  1914 M     Hillary     9 0.0000132
##  4  1973 F     Hillary   251 0.000162
##  5  1953 F     Hillary    57 0.0000296
##  6  1936 M     Hillary     7 0.00000658
##  7  1944 F     Hillary    19 0.0000139
##  8  1945 F     Hillary    19 0.0000141
##  9  1975 M     Hillary    10 0.00000616
## 10  1913 M     Hillary    10 0.0000186
## # ... with 39 more rows
```

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

```
## [1] 6701
```

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

```
## # A tibble: 77 x 5
##     year sex   name      n      prop
##    <dbl> <chr> <chr> <int>     <dbl>
##  1  1947 F     Joe     227 0.000125
##  2  1887 M     Joe     685 0.00627
##  3  1979 F     Joe      28 0.0000162
##  4  1932 M     Joe    6696 0.00623
##  5  1994 M     Joe    1205 0.000591
##  6  1941 M     Joe    7150 0.00570
##  7  1898 M     Joe     827 0.00626
##  8  1937 F     Joe     226 0.000205
##  9  1909 F     Joe      43 0.000117
## 10  1982 M     Joe    1872 0.000992
## # ... with 67 more rows
```

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

```
## [1] 130303
```

```
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")
```