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
```

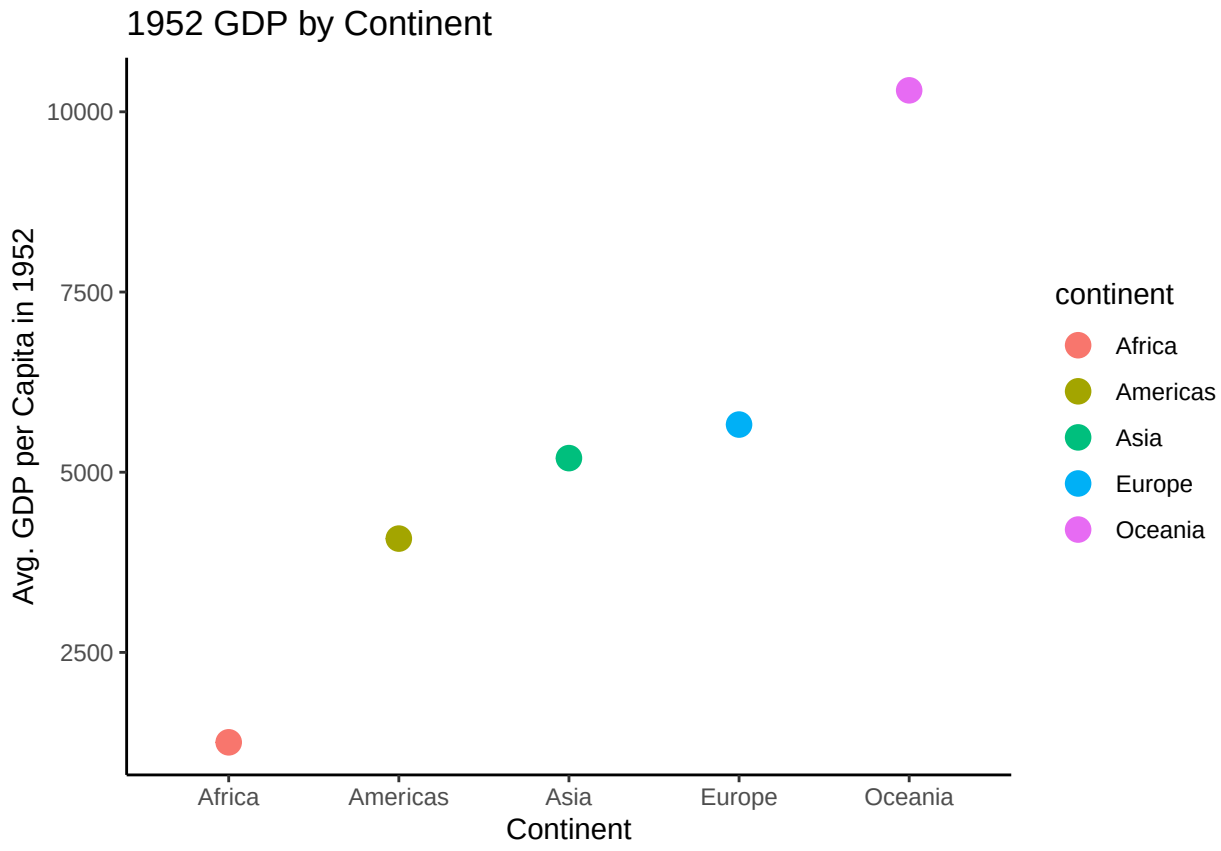
```
kable_1<-kable(new_table, format = "latex", booktabs=TRUE, digits = 2,     ## call kable to make the tab
      col.names = c("continent", "mean_GPD_per_capita_2007", "mean_GPD_per_capita_1952"),
      caption = "Total population and GDP per capita by continent" )
kable_1
```

Table 1: Total population and GDP per capita by continent

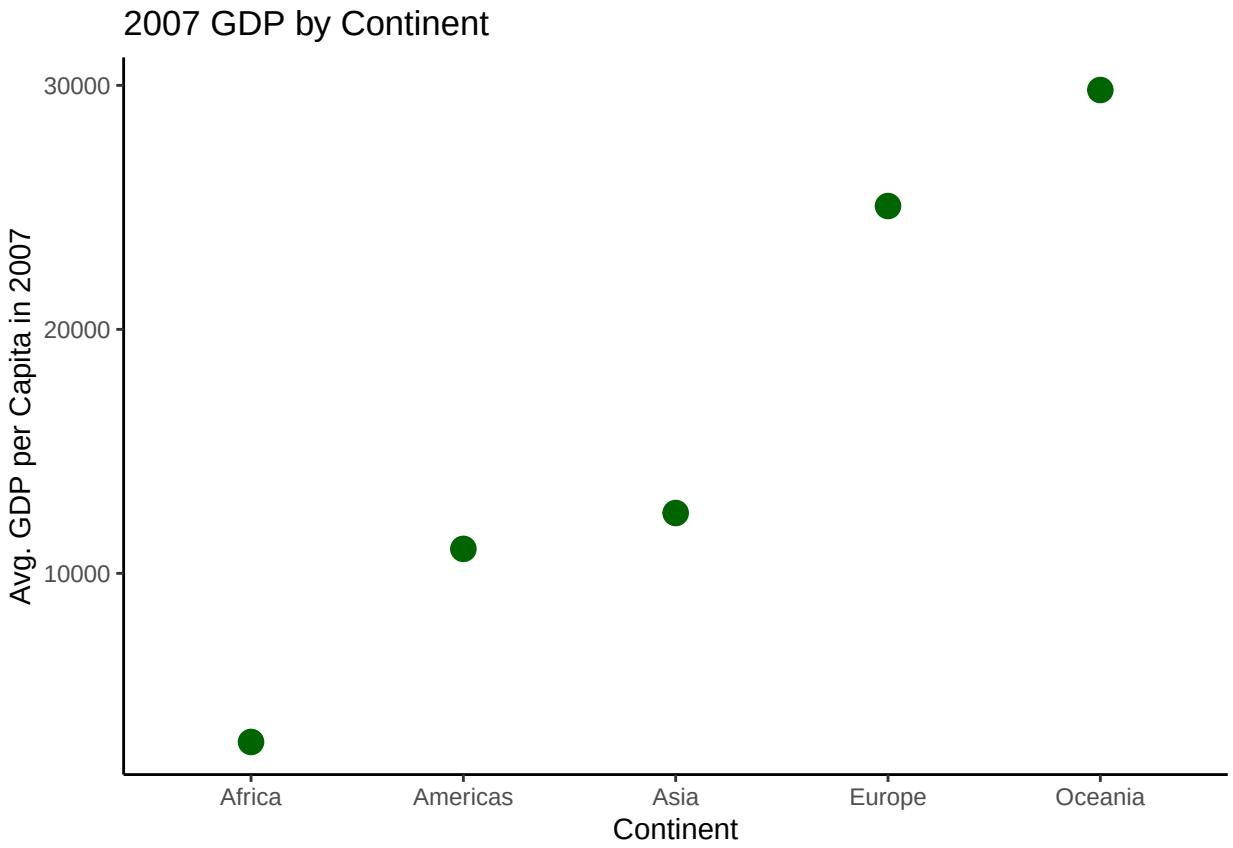
continent	mean_GPD_per_capita_2007	mean_GPD_per_capita_1952
Africa	3089.03	1252.57
Americas	11003.03	4079.06
Asia	12473.03	5195.48
Europe	25054.48	5661.06
Oceania	29810.19	10298.09

(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)
```

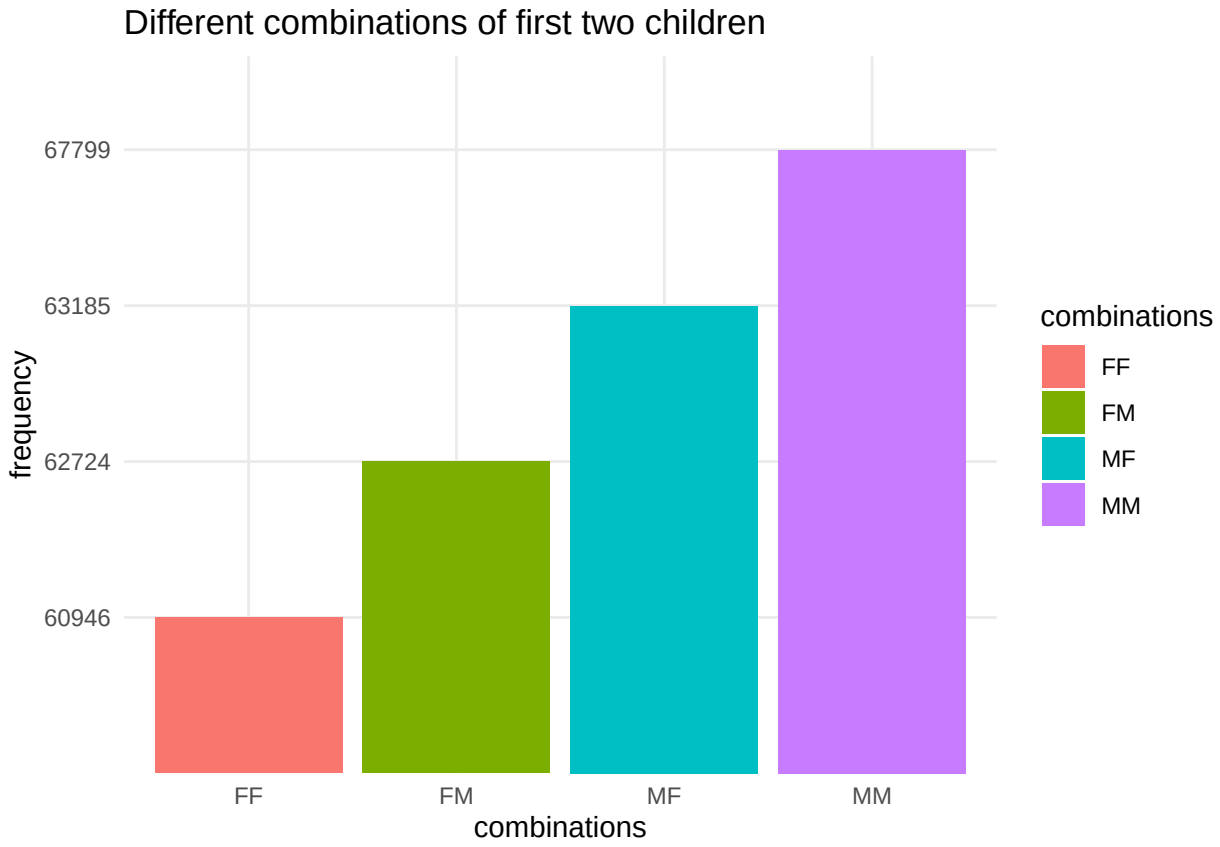
```
## [1] 8.49069
```

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

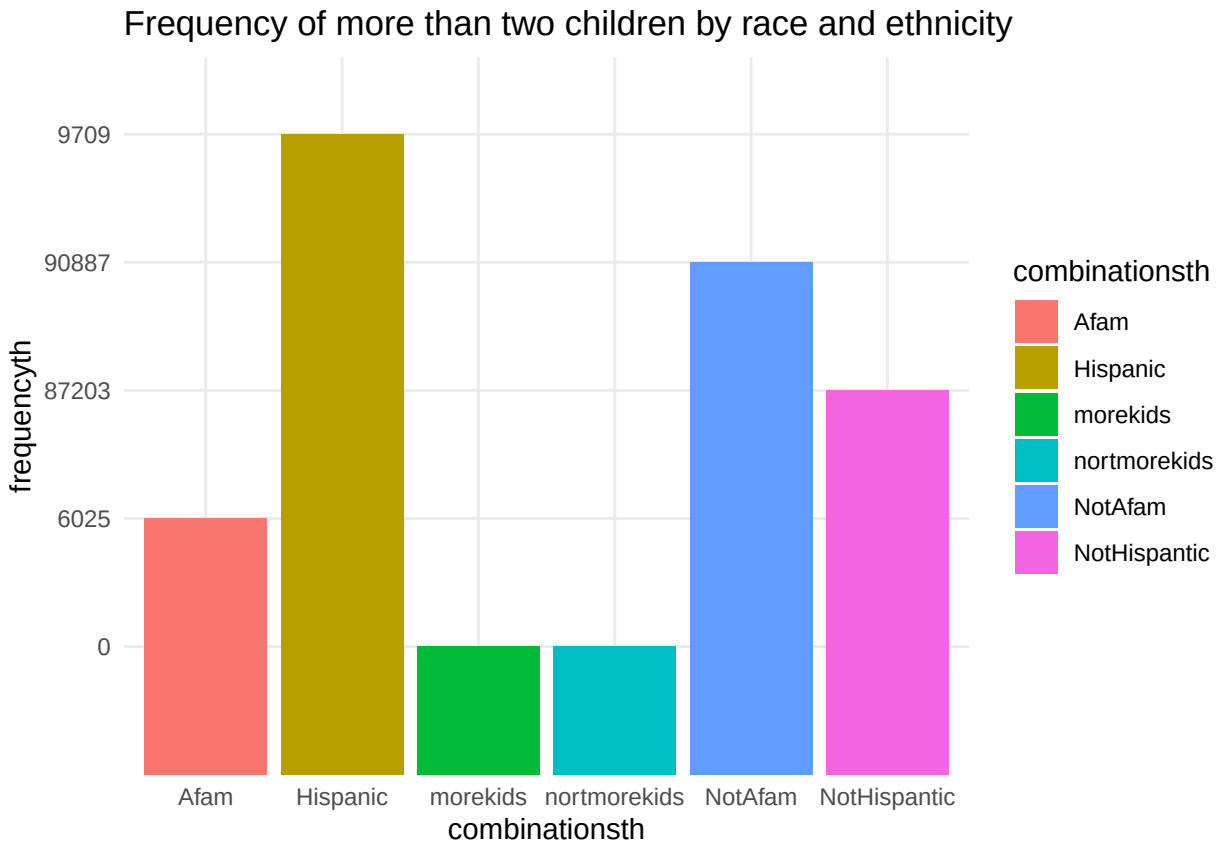
Question 2

```
#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
```

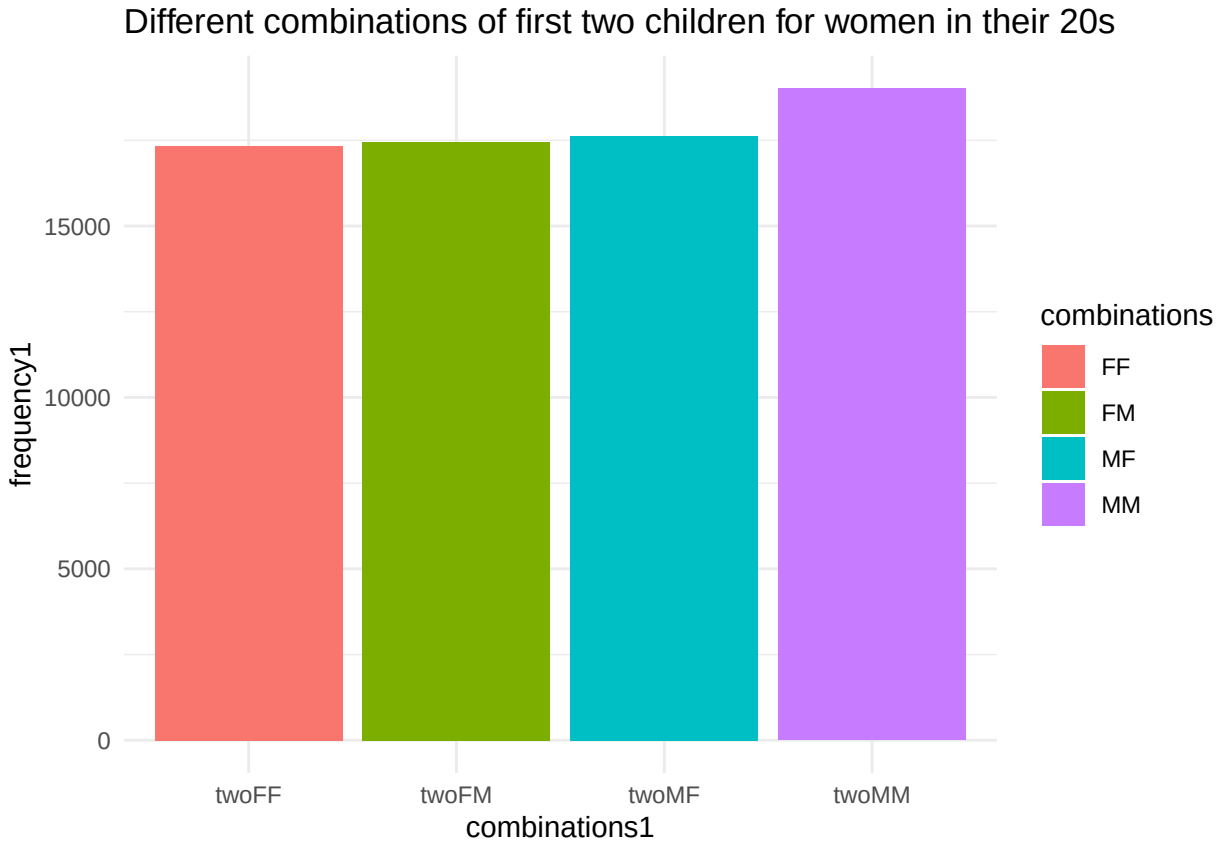
```
nrow(twoFF)==nrow(thirFF)
```

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

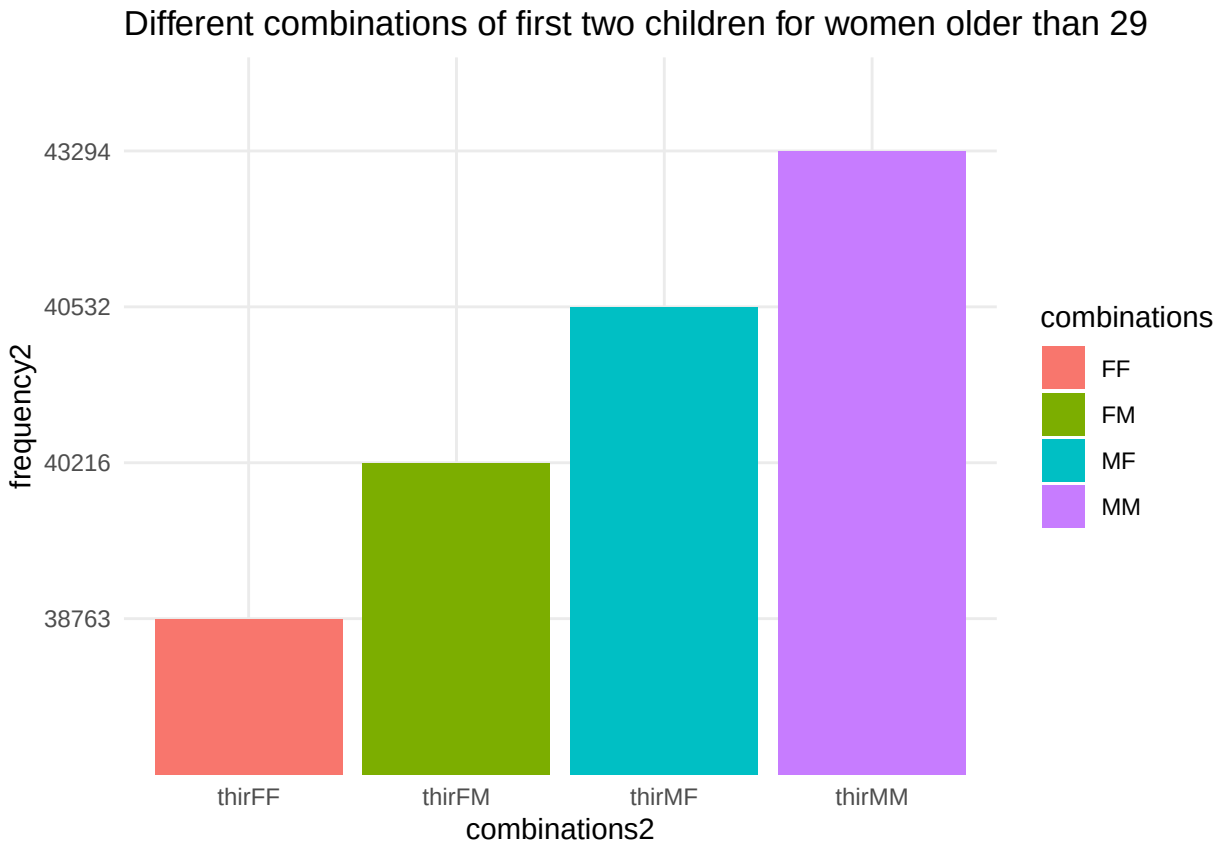
```r
nrow(twoFM)==nrow(thirFM)
```

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

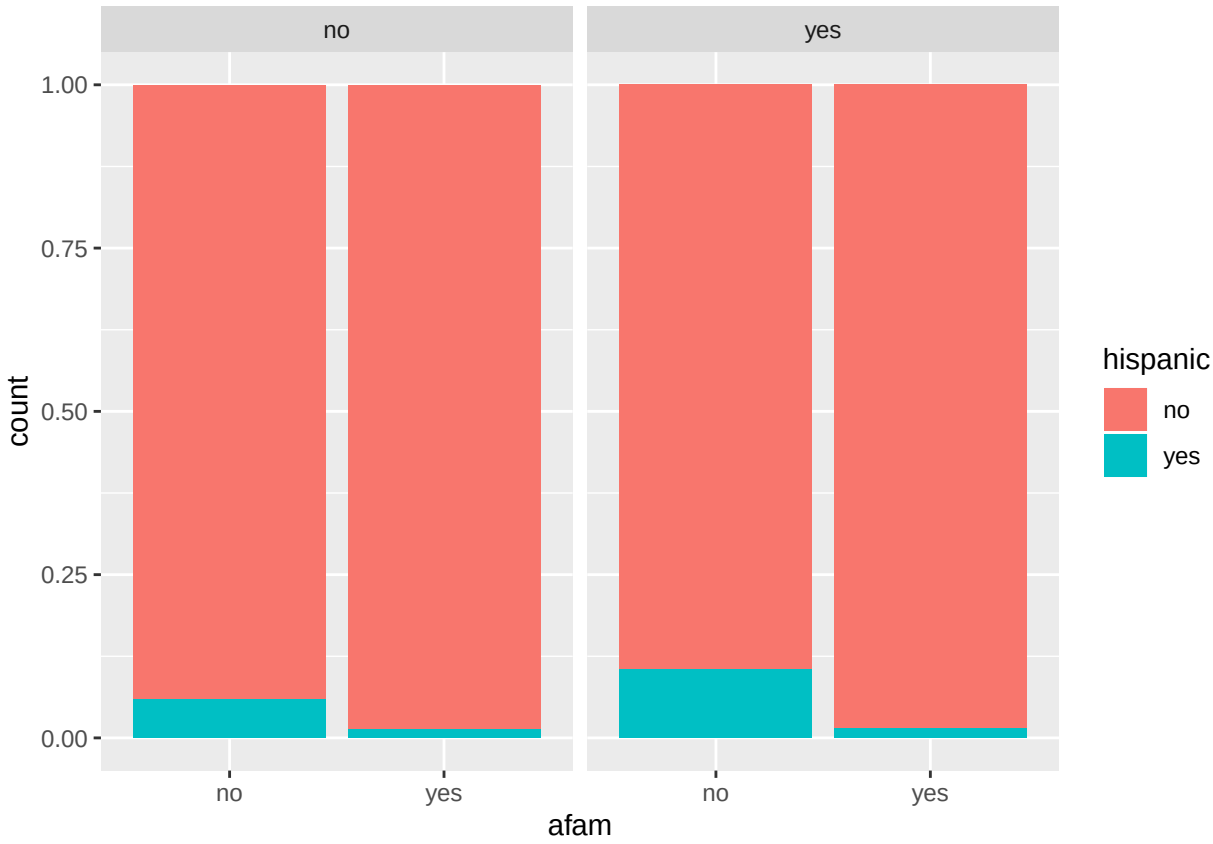
```r
frequency2<-c(nrow(thirMM),nrow(thirMF),nrow(thirFF),nrow(thirFM))
combinations2<-c("thirMM","thirMF","thirFF","thirFM")
da<-data.frame(cbind(frequency2,combinations2))

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")
```




```
ggplot(data2)+aes(x=afam,fill=hispanic)+geom_bar(position = "fill")+facet_grid(.~morekids)
```



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')
```

```
knitr::kable(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

```
knitr::kable(mpgmerc)
```

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
mercury	mountaineer 4wd	4.0	1999	6	auto(l5)	4	14	17	r	suv
mercury	mountaineer 4wd	4.0	2008	6	auto(l5)	4	13	19	r	suv
mercury	mountaineer 4wd	4.6	2008	8	auto(l6)	4	13	19	r	suv
mercury	mountaineer 4wd	5.0	1999	8	auto(l4)	4	13	17	r	suv

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     Joseph     2632
##  3 M     Harry      2152
##  4 M     Walter     1755
##  5 M     Arthur     1599
##  6 M     David       869
##  7 M     Andrew      644
##  8 M     Daniel      643
##  9 M     Will        588
## 10 M     Herbert     424
## # ... 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     Joseph     2632
## 3 M     Harry      2152
## 4 M     Walter     1755
## 5 M     Arthur     1599
```

```
## # A tibble: 233 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Mary       7065
##  2 F     Minnie     1746
##  3 F     Nellie      995
##  4 F     Grace       982
##  5 F     Julia       783
##  6 F     Catherine   688
##  7 F     Lillie      647
##  8 F     Louise      635
##  9 F     Pearl       569
## 10 F     Daisy       564
## # ... with 223 more rows
```

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	Mary	7065
M	Joseph	2632	F	Minnie	1746
M	Harry	2152	F	Nellie	995
M	Walter	1755	F	Grace	982
M	Arthur	1599	F	Julia	783

```
## # A tibble: 233 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Mary         7065
##  2 F     Minnie       1746
##  3 F     Nellie        995
##  4 F     Grace         982
##  5 F     Julia         783
##  6 F     Catherine     688
##  7 F     Lillie        647
##  8 F     Louise        635
##  9 F     Pearl         569
## 10 F     Daisy         564
## # ... with 223 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m total_m
##   <chr> <chr>    <int>
## 1 F     Mary      7065
## 2 F     Minnie    1746
## 3 F     Nellie     995
## 4 F     Grace      982
## 5 F     Julia      783
```

```
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   Mary    7065
## 2     M  Joseph    2632     F Minnie    1746
## 3     M   Harry    2152     F Nellie     995
## 4     M  Walter    1755     F  Grace     982
## 5     M  Arthur    1599     F  Julia     783
```

```
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: 1,281 x 3
## # Groups:   sex_f [1]
##    sex_f name_f   total_f
##    <chr> <chr>      <int>
##  1 M     John       56913
##  2 M     Robert     48678
##  3 M     Thomas     14938
##  4 M     Paul       12569
##  5 M     Raymond    12194
##  6 M     Jack        9599
##  7 M     Clarence    7222
##  8 M     Roy         6353
##  9 M     Joe         6071
## 10 M     Norman      4109
## # ... with 1,271 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     Robert    48678
## 3 M     Thomas    14938
## 4 M     Paul      12569
## 5 M     Raymond   12194
```

```
## # A tibble: 1,542 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Mary      70980
##  2 F     Dorothy   36643
##  3 F     Ruth      26101
##  4 F     Elizabeth 15910
##  5 F     Anna      14580
##  6 F     Marie     12743
##  7 F     Florence  10732
##  8 F     Lillian   10049
##  9 F     Rose       9011
## 10 F     Martha     8709
## # ... with 1,532 more rows
```

```
## # A tibble: 233 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Mary         7065
##  2 F     Minnie       1746
##  3 F     Nellie        995
##  4 F     Grace         982
##  5 F     Julia         783
##  6 F     Catherine     688
##  7 F     Lillie        647
```

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	Mary	7065
M	Robert	48678	F	Minnie	1746
M	Thomas	14938	F	Nellie	995
M	Paul	12569	F	Grace	982
M	Raymond	12194	F	Julia	783

```
##  8 F     Louise        635
##  9 F     Pearl         569
## 10 F     Daisy         564
## # ... with 223 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m total_m
##   <chr> <chr>    <int>
## 1 F     Mary      7065
## 2 F     Minnie    1746
## 3 F     Nellie     995
## 4 F     Grace      982
## 5 F     Julia      783
```

```
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   Mary    7065
## 2     M  Robert   48678     F Minnie    1746
## 3     M  Thomas   14938     F Nellie     995
## 4     M    Paul   12569     F  Grace     982
## 5     M Raymond   12194     F  Julia     783
```

```
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: 1,134 x 3
## # Groups:   sex_f [1]
##    sex_f name_f  total_f
##    <chr> <chr>     <int>
##  1 M     Robert    72369
##  2 M     Mark      58731
##  3 M     Richard   43561
##  4 M     Timothy   30484
##  5 M     Donald    22731
##  6 M     Gregory   20316
```

```
##  7 M     Dennis    14314
##  8 M     Randy     14215
##  9 M     Ricky     10994
## 10 M     Frank     10759
## # ... with 1,124 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_f [1]
##   sex_f name_f  total_f
##   <chr> <chr>     <int>
## 1 M     Robert    72369
## 2 M     Mark      58731
## 3 M     Richard   43561
## 4 M     Timothy   30484
## 5 M     Donald    22731
```

```
## # A tibble: 1,912 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Deborah   25264
##  2 F     Sandra    24571
##  3 F     Barbara   24444
##  4 F     Cheryl    19126
##  5 F     Elizabeth 18858
##  6 F     Teresa    18835
##  7 F     Lori      18685
##  8 F     Kathy     18481
##  9 F     Debbie    17055
## 10 F     Kathleen  16084
## # ... with 1,902 more rows
```

```
## # A tibble: 1,912 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Deborah     25264
##  2 F     Sandra      24571
##  3 F     Barbara     24444
##  4 F     Cheryl      19126
##  5 F     Elizabeth   18858
##  6 F     Teresa      18835
##  7 F     Lori        18685
##  8 F     Kathy       18481
##  9 F     Debbie      17055
## 10 F     Kathleen    16084
## # ... with 1,902 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m    total_m
##   <chr> <chr>       <int>
## 1 F     Deborah     25264
```

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

sex_f	name_f	total_f	sex_m	name_m	total_m
M	Robert	72369	F	Deborah	25264
M	Mark	58731	F	Sandra	24571
M	Richard	43561	F	Barbara	24444
M	Timothy	30484	F	Cheryl	19126
M	Donald	22731	F	Elizabeth	18858

```
## 2 F     Sandra      24571
## 3 F     Barbara     24444
## 4 F     Cheryl      19126
## 5 F     Elizabeth   18858
```

```
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  Robert   72369     F   Deborah   25264
## 2     M    Mark   58731     F    Sandra   24571
## 3     M Richard   43561     F   Barbara   24444
## 4     M Timothy   30484     F    Cheryl   19126
## 5     M  Donald   22731     F Elizabeth   18858
```

```
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: 3,165 x 3
## # Groups:   sex_f [1]
##    sex_f name_f   total_f
##    <chr> <chr>      <int>
##  1 M     Jacob      34471
##  2 M     Matthew    28572
##  3 M     Anthony    19648
##  4 M     Justin     17779
##  5 M     Jonathan   16882
##  6 M     Austin     15944
##  7 M     Noah       14270
##  8 M     Nathan     13036
```

```
##  9 M     Cameron    12761
## 10 M     Kevin      12667
## # ... with 3,155 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     Matthew    28572
## 3 M     Anthony    19648
## 4 M     Justin     17779
## 5 M     Jonathan   16882
```

```
## # A tibble: 4,650 x 3
## # Groups:   sex [1]
##    sex   name      total
##    <chr> <chr>     <int>
##  1 F     Ashley    17997
##  2 F     Elizabeth 15094
##  3 F     Emma      12548
##  4 F     Jasmine    9097
##  5 F     Savannah   7099
##  6 F     Rebecca    7063
##  7 F     Sophia     6563
##  8 F     Mackenzie  6348
##  9 F     Mary       6192
## 10 F     Danielle   6088
## # ... with 4,640 more rows
```

```
## # A tibble: 4,650 x 3
## # Groups:   sex_m [1]
##    sex_m name_m    total_m
##    <chr> <chr>       <int>
##  1 F     Ashley      17997
##  2 F     Elizabeth   15094
##  3 F     Emma        12548
##  4 F     Jasmine      9097
##  5 F     Savannah     7099
##  6 F     Rebecca      7063
##  7 F     Sophia       6563
##  8 F     Mackenzie    6348
##  9 F     Mary         6192
## 10 F     Danielle     6088
## # ... with 4,640 more rows
```

```
## # A tibble: 5 x 3
## # Groups:   sex_m [1]
##   sex_m name_m    total_m
##   <chr> <chr>       <int>
```

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	Ashley	17997
M	Matthew	28572	F	Elizabeth	15094
M	Anthony	19648	F	Emma	12548
M	Justin	17779	F	Jasmine	9097
M	Jonathan	16882	F	Savannah	7099

```
## 1 F     Ashley      17997
## 2 F     Elizabeth   15094
## 3 F     Emma        12548
## 4 F     Jasmine      9097
## 5 F     Savannah     7099
```

```
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    Ashley   17997
## 2     M  Matthew   28572     F Elizabeth   15094
## 3     M  Anthony   19648     F      Emma   12548
## 4     M   Justin   17779     F   Jasmine    9097
## 5     M Jonathan   16882     F  Savannah    7099
```

```
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
```

```
#names were used in the 19th century but have not been used in the 21sth century
nineth_cen<-filter(sample,year>"2000")
nineth_cen
name_in<-unique(nineth_cen$name)
name_in
```

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

```
## # A tibble: 491,107 x 5
##     year sex   name         n       prop
##    <dbl> <chr> <chr>    <int>      <dbl>
##  1  2012 M     Hatcher     17 0.00000839
##  2  1975 F     Sheryl     576 0.000369
##  3  1908 F     Floyd       13 0.0000367
##  4  1994 M     Thurston    14 0.00000687
##  5  1929 F     Ellenora     7 0.00000605
##  6  1977 F     Jeanell     11 0.00000669
##  7  2010 F     Ahnesti      8 0.00000409
##  8  2010 F     Kanylah      9 0.0000046
##  9  1970 F     Buffie      92 0.0000502
## 10  1955 M     Collie      19 0.00000909
## # ... with 491,097 more rows
```

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

```
## # A tibble: 53 x 5
##     year sex   name       n       prop
##    <dbl> <chr> <chr>  <int>      <dbl>
##  1  1972 F     Donald    77 0.0000478
##  2  1948 M     Donald 26442 0.0148
##  3  2010 M     Donald   764 0.000372
##  4  1947 F     Donald    63 0.0000347
##  5  1927 F     Donald   144 0.000116
##  6  1891 M     Donald   100 0.000915
##  7  1997 F     Donald     9 0.00000471
##  8  2006 M     Donald  1098 0.000501
##  9  1917 M     Donald  8729 0.00910
## 10  1923 M     Donald 16436 0.0145
## # ... with 43 more rows
```

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

```
## [1] 413352
```

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

```
## # A tibble: 41 x 5
```

```
##     year sex   name       n       prop
##    <dbl> <chr> <chr>  <int>      <dbl>
##  1  1952 F     Hilary   100 0.0000526
##  2  1963 M     Hilary    24 0.0000116
##  3  1949 F     Hilary    86 0.0000490
##  4  1909 M     Hilary     7 0.0000396
##  5  1954 F     Hilary   116 0.0000583
##  6  1883 M     Hilary     6 0.0000533
##  7  1976 M     Hilary    11 0.00000674
##  8  1915 M     Hilary    36 0.0000409
##  9  1992 F     Hilary  1170 0.000584
## 10  1919 M     Hilary    35 0.0000345
## # ... with 31 more rows
```

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

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

```
## # A tibble: 40 x 5
##     year sex   name        n       prop
##    <dbl> <chr> <chr>   <int>      <dbl>
##  1  1921 M     Hillary    21 0.0000184
##  2  2009 F     Hillary   200 0.0000989
##  3  1955 F     Hillary    71 0.0000354
##  4  1986 M     Hillary    11 0.00000573
##  5  1997 F     Hillary   294 0.000154
##  6  1974 F     Hillary   313 0.000200
##  7  1946 M     Hillary    20 0.0000121
##  8  1909 M     Hillary     7 0.0000396
##  9  1988 M     Hillary    13 0.0000065
## 10  1983 F     Hillary   697 0.000390
## # ... with 30 more rows
```

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

```
## [1] 6867
```

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

```
## # A tibble: 79 x 5
##     year sex   name      n       prop
##    <dbl> <chr> <chr> <int>      <dbl>
##  1  2001 M     Joe     959 0.000464
##  2  1937 M     Joe    7742 0.00708
##  3  1895 M     Joe     763 0.00602
##  4  1955 F     Joe     183 0.0000913
##  5  1946 M     Joe    7536 0.00457
##  6  1988 F     Joe      20 0.0000104
##  7  1949 M     Joe    6529 0.00362
```

```
##  8  1993 F     Joe       7 0.00000355
##  9  1954 F     Joe     215 0.000108
## 10  1901 M     Joe     756 0.00654
## # ... with 69 more rows
```

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

```
## [1] 159060
```

```
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
```

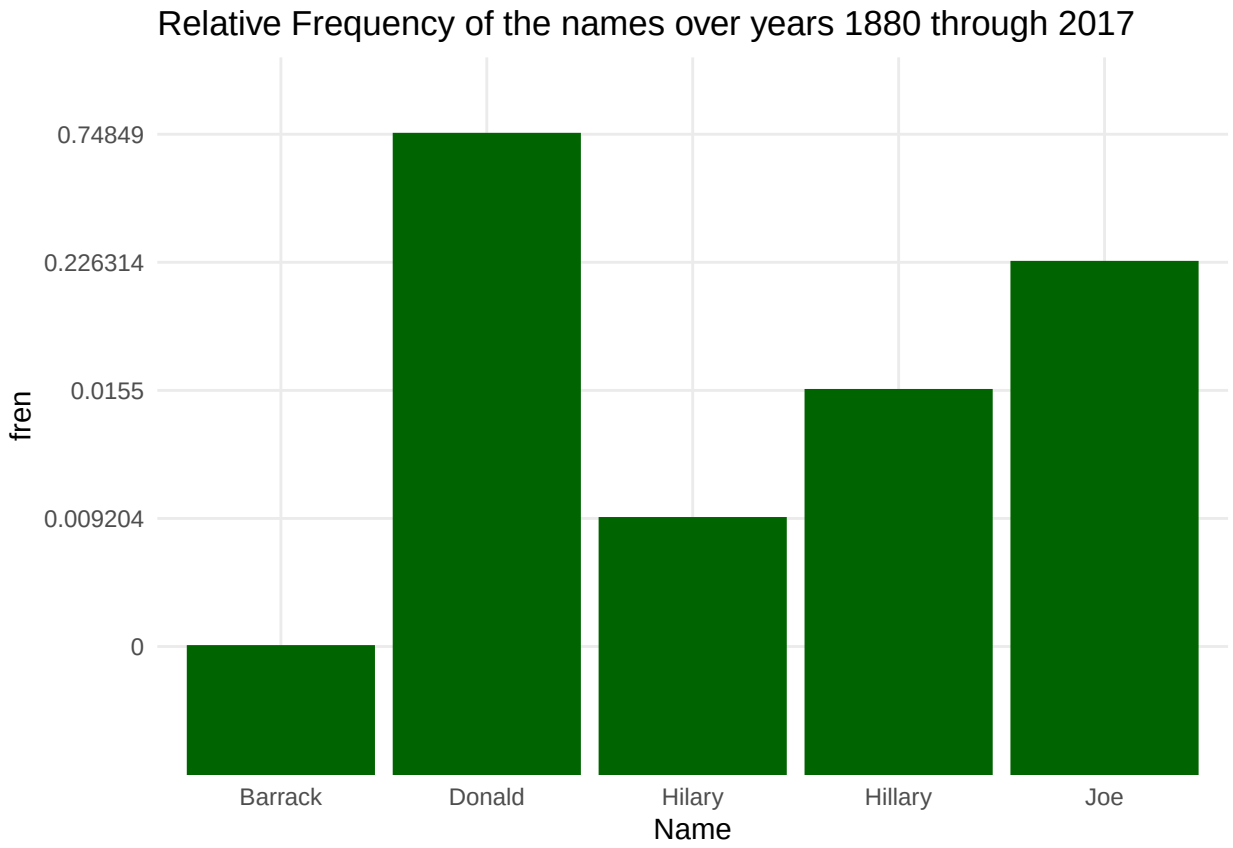
```
## [1] 0
```

```
fren<-c(374245/500000,4602/500000,7750/500000,113157/500000,0/500000)
fren
```

```
## [1] 0.748490 0.009204 0.015500 0.226314 0.000000
```

```
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")
```


Relative Frequency of the names over years 1880 through 2017
0.74849
0.226314
0.0155
0.009204
0
fren
Barrack
Donald
Hilary
Hillary
Joe
Name