606_week_1_Lab

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Introduction to R and RStudio

```
arbuthnot = read.table("arbuthnot.dat", header = TRUE)
arbuthnot
```

```
##
      year boys girls
     1629 5218
                 4683
## 2
     1630 4858
                 4457
## 3
     1631 4422
                 4102
## 4 1632 4994
                 4590
## 5
     1633 5158
## 6
     1634 5035
                 4820
## 7
      1635 5106
                 4928
## 8 1636 4917
                 4605
## 9 1637 4703
                 4457
## 10 1638 5359
                 4952
## 11 1639 5366
                 4784
## 12 1640 5518
                 5332
## 13 1641 5470
                 5200
## 14 1642 5460
                 4910
                 4617
## 15 1643 4793
## 16 1644 4107
                 3997
## 17 1645 4047
                 3919
## 18 1646 3768
                 3395
## 19 1647 3796
                 3536
## 20 1648 3363
## 21 1649 3079
                 2746
## 22 1650 2890
                 2722
## 23 1651 3231
                 2840
## 24 1652 3220
                 2908
## 25 1653 3196
                 2959
## 26 1654 3441
                 3179
## 27 1655 3655
                 3349
## 28 1656 3668
                 3382
## 29 1657 3396
                 3289
## 30 1658 3157
                 3013
## 31 1659 3209
                 2781
## 32 1660 3724
                 3247
## 33 1661 4748
                 4107
## 34 1662 5216
                 4803
## 35 1663 5411
## 36 1664 6041
                 5681
## 37 1665 5114
                 4858
## 38 1666 4678
                 4319
## 39 1667 5616
                 5322
## 40 1668 6073
                 5560
```

```
## 41 1669 6506
                 5829
## 42 1670 6278
                 5719
## 43 1671 6449
                 6061
## 44 1672 6443
                 6120
## 45 1673 6073
                 5822
## 46 1674 6113
                 5738
## 47 1675 6058
                 5717
## 48 1676 6552
                 5847
## 49 1677 6423
                 6203
## 50 1678 6568
                 6033
## 51 1679 6247
                 6041
## 52 1680 6548
                 6299
## 53 1681 6822
                 6533
## 54 1682 6909
                 6744
## 55 1683 7577
                 7158
## 56 1684 7575
                 7127
## 57 1685 7484
                 7246
## 58 1686 7575
                 7119
## 59 1687 7737
                 7214
## 60 1688 7487
                 7101
## 61 1689 7604
                 7167
## 62 1690 7909
## 63 1691 7662
                 7392
## 64 1692 7602
                 7316
## 65 1693 7676
                 7483
## 66 1694 6985
                 6647
## 67 1695 7263
                 6713
## 68 1696 7632
                 7229
## 69 1697 8062
                 7767
## 70 1698 8426
                 7626
## 71 1699 7911
                 7452
## 72 1700 7578
                 7061
## 73 1701 8102
                 7514
## 74 1702 8031
                 7656
## 75 1703 7765
                 7683
## 76 1704 6113
                 5738
## 77 1705 8366
                 7779
## 78 1706 7952
                 7417
## 79 1707 8379
                 7687
## 80 1708 8239
                 7623
## 81 1709 7840
                 7380
## 82 1710 7640
                 7288
dim(arbuthnot)
## [1] 82 3
names(arbuthnot)
```

[1] "year" "boys" "girls"

arbuthnot\$boys

```
## [1] 5218 4858 4422 4994 5158 5035 5106 4917 4703 5359 5366 5518 5470 5460  
## [15] 4793 4107 4047 3768 3796 3363 3079 2890 3231 3220 3196 3441 3655 3668  
## [29] 3396 3157 3209 3724 4748 5216 5411 6041 5114 4678 5616 6073 6506 6278  
## [43] 6449 6443 6073 6113 6058 6552 6423 6568 6247 6548 6822 6909 7577 7575  
## [57] 7484 7575 7737 7487 7604 7909 7662 7602 7676 6985 7263 7632 8062 8426  
## [71] 7911 7578 8102 8031 7765 6113 8366 7952 8379 8239 7840 7640
```

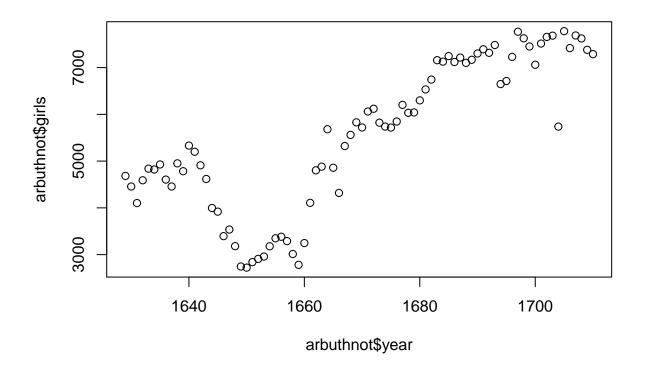
What command would you use to extract just the counts of girls baptized? Try it!

arbuthnot\$girls

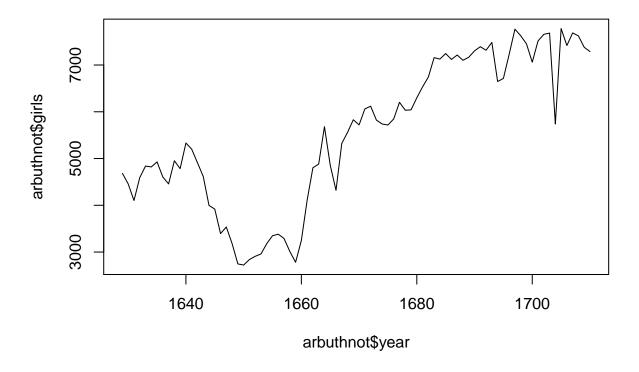
```
## [1] 4683 4457 4102 4590 4839 4820 4928 4605 4457 4952 4784 5332 5200 4910
## [15] 4617 3997 3919 3395 3536 3181 2746 2722 2840 2908 2959 3179 3349 3382
## [29] 3289 3013 2781 3247 4107 4803 4881 5681 4858 4319 5322 5560 5829 5719
## [43] 6061 6120 5822 5738 5717 5847 6203 6033 6041 6299 6533 6744 7158 7127
## [57] 7246 7119 7214 7101 7167 7302 7392 7316 7483 6647 6713 7229 7767 7626
## [71] 7452 7061 7514 7656 7683 5738 7779 7417 7687 7623 7380 7288

plot(x = arbuthnot$year, y = arbuthnot$girls)
```





```
plot(x = arbuthnot$year, y = arbuthnot$girls, type = "1")
```



?plot

Is there an apparent trend in the number of girls baptized over the years? How would you describe it?

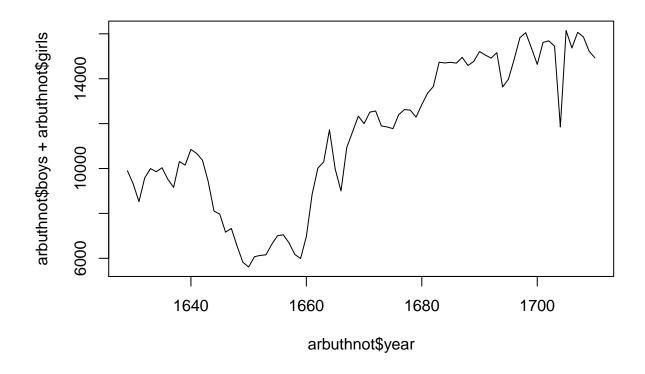
Yes, the number of girls baptized increased significantly from year 1660 to 1700 from 3000 to more than 7000 girls per year.

```
5218 + 4683
```

[1] 9901

```
arbuthnot$boys + arbuthnot$girls
```

```
[1]
        9901
               9315
                     8524
                           9584
                                 9997
                                        9855 10034
                                                    9522
                                                          9160 10311 10150
  [12] 10850 10670 10370
                                 8104
                                                    7332
                                                          6544
##
                           9410
                                       7966
                                              7163
                                                                5825
               6128
                     6155
                           6620
                                 7004
                                       7050
                                              6685
                                                    6170
                                                          5990
                                                                6971
                                 8997 10938 11633 12335 11997 12510 12563
  [34] 10019 10292 11722
                           9972
       11895 11851 11775 12399 12626 12601 12288 12847 13355 13653 14735
       14702 14730 14694 14951 14588 14771 15211 15054 14918 15159 13632
       13976 14861 15829 16052 15363 14639 15616 15687 15448 11851 16145
  [78] 15369 16066 15862 15220 14928
```



5218 / 4683

[1] 1.114243

```
arbuthnot$boys / arbuthnot$girls
```

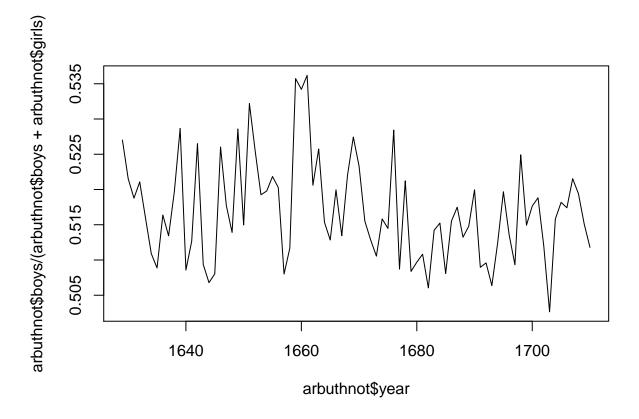
```
## [1] 1.114243 1.089971 1.078011 1.088017 1.065923 1.044606 1.036120 ## [8] 1.067752 1.055194 1.082189 1.121656 1.034884 1.051923 1.112016 ## [15] 1.038120 1.027521 1.032661 1.109867 1.073529 1.057215 1.121267 ## [22] 1.061719 1.137676 1.107290 1.080095 1.082416 1.091371 1.084565 ## [29] 1.032533 1.047793 1.153901 1.146905 1.156075 1.085988 1.108584 ## [36] 1.063369 1.052697 1.083121 1.055242 1.092266 1.116143 1.097744 ## [43] 1.064016 1.052778 1.043112 1.065354 1.059647 1.120575 1.035467 ## [50] 1.088679 1.034100 1.039530 1.044237 1.024466 1.058536 1.062860 ## [57] 1.032846 1.064054 1.072498 1.054359 1.060974 1.083128 1.036526 ## [64] 1.039092 1.025792 1.050850 1.081931 1.055748 1.037981 1.104904 ## [71] 1.061594 1.073219 1.078254 1.048981 1.010673 1.065354 1.075460 ## [78] 1.072132 1.090022 1.080808 1.062331 1.048299
```

arbuthnot\$boys / (arbuthnot\$boys + arbuthnot\$girls)

```
[1] 0.5270175 0.5215244 0.5187705 0.5210768 0.5159548 0.5109082 0.5088698
##
    [8] 0.5163831 0.5134279 0.5197362 0.5286700 0.5085714 0.5126523 0.5265188
       0.5093518 0.5067868 0.5080341 0.5260366 0.5177305 0.5139059 0.5285837
       0.5149679 0.5322023 0.5254569 0.5192526 0.5197885 0.5218447 0.5202837
##
       0.5080030 0.5116694 0.5357262 0.5342132 0.5361942 0.5206108 0.5257482
       0.5153557 0.5128359 0.5199511 0.5134394 0.5220493 0.5274422 0.5232975
##
       0.5155076 0.5128552 0.5105507 0.5158214 0.5144798 0.5284297 0.5087122
       0.5212285 0.5083822 0.5096910 0.5108199 0.5060426 0.5142178 0.5152360
##
       0.5080788 0.5155165 0.5174905 0.5132301 0.5147925 0.5199527 0.5089677
       0.5095857 0.5063659 0.5123973 0.5196766 0.5135590 0.5093183 0.5249190
   [71] 0.5149385 0.5176583 0.5188268 0.5119526 0.5026541 0.5158214 0.5181790
   [78] 0.5174052 0.5215362 0.5194175 0.5151117 0.5117899
```

Now, make a plot of the proportion of boys over time. What do you see? Tip: If you use the up and down arrow keys, you can scroll through your previous commands, your so-called command history. You can also access it by clicking on the history tab in the upper right panel. This will save you a lot of typing in the future.

```
plot(arbuthnot$year, arbuthnot$boys / (arbuthnot$boys + arbuthnot$girls), type = "1")
```



Observation:- The propotion of the number of boys increased during year 1660 - about 0.535. However, the propotion seems to be uniiform ranging from 0.505 and 0.535.

On Your Own

1. What years are included in this data set? What are the dimensions of the data frame and what are the variable or column names?

```
source("/Users/salmaelshahawy/desktop/MSDS_2019/Fall2019/statistics_606/week_1/lab_1/DATA606-master/dat
("data/present.R")
## [1] "data/present.R"
present$year
## [1] 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953
## [15] 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967
## [29] 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981
## [43] 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
## [57] 1996 1997 1998 1999 2000 2001 2002
dim(present)
## [1] 63 3
names(present)
## [1] "year" "boys" "girls"
  2. How do these counts compare to Arbuthnot's? Are they on a similar scale?
range(present$year)
## [1] 1940 2002
range(arbuthnot$year)
## [1] 1629 1710
dim(present)
## [1] 63 3
dim(arbuthnot)
## [1] 82 3
names(present)
## [1] "year" "boys" "girls"
```

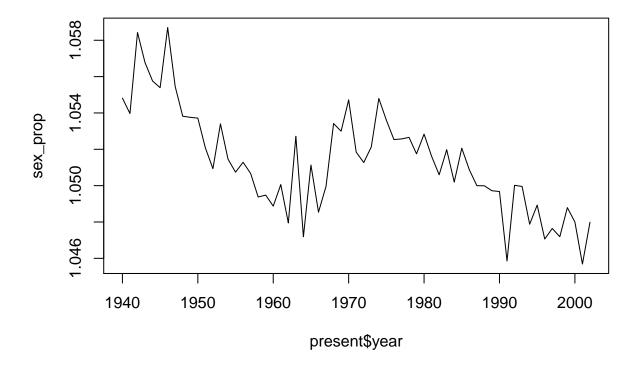
```
names(arbuthnot)
```

```
## [1] "year" "boys" "girls"
```

Only the variable names are on a similar scale. Both the dimensions and the years are not on the same scale. Present's data is newer and smaller dimension-wise than Arbuthnot's.

3. Make a plot that displays the boy-to-girl ratio for every year in the data set. What do you see? Does Arbuthnot's observation about boys being born in greater proportion than girls hold up in the U.S.? Plot included.

```
sex_prop = present$boys/present$girls
plot(present$year, sex_prop, type = "l")
```



Arbuthnot's observation seems to hold for the mid 1940s; however even that proportion of (at its highest 1.058) between 1940 and 1950 it overall decreases as the years pass to reach to the lowest point on 2000 on 1.046 sex_prop.

4. In what year did we see the most total number of births in the U.S.?

```
total_birth = present$boys+ present$girls
pres_df = matrix(c(present$year,total_birth), ncol = 2, byrow = F)
colnames(pres_df) = c("Year", "Births")
head(as.table(pres_df))
```

```
## Year Births
## A 1940 2360399
## B 1941 2513427
## C 1942 2808996
## D 1943 2936860
## E 1944 2794800
## F 1945 2735456

x = row(pres_df)[pres_df == max(pres_df)]
pres_df[x,]
```

Year Births ## 1961 4268326

At yeat 1961