

# INFX 573 Lab: Data Wrangling

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Collaborators:

Don't forget to list the full names of your collaborators!

## Instructions:

Before beginning this assignment, please ensure you have access to R and/or RStudio.

1. Download the `week3a_lab.Rmd` file from Canvas. Open `week3a_lab.Rmd` in RStudio (or your favorite editor) and supply your solutions to the assignment by editing `week3a_lab.Rmd`. You will also want to download the `weather.txt` data file, containing a dataset capturing daily temperatures in Cuernavaca, Mexico during 2010.
2. Replace the "Insert Your Name Here" text in the `author:` field with your own full name.
3. Be sure to include code chunks, figures and written explanations as necessary. Any collaborators must be listed on the top of your assignment. Any figures should be clearly labeled and appropriately referenced within the text.
4. When you have completed the assignment and have **checked** that your code both runs in the Console and knits correctly when you click Knit, rename the R Markdown file to `YourLastName_YourFirstName_lab3a.Rmd`, and knit it into a PDF. Submit the compiled PDF on Canvas.

In this lab, you will need access to the following R packages:

```
# Load some helpful libraries
library(tidyverse)
library(babynames)
library(reshape2)
```

## Problem 1: Data Cleaning

In this problem we will use the `weather.txt` data. Import the data in R and answer the following questions.

Hint: You might find the function `read.table()` useful here.

```
# Read in weather.txt
weather <- read.table(file = "weather.txt", header = TRUE,
  check.names = F)
```

(a) What are the variables in this dataset? Describe what each variable measures.

id, year, month, element (max temperature and min temperature) and days

Hint: There are five variables of interest here.

```
# explore the dataset
head(weather)
```

```
##           id year month element d1  d2  d3
## 1 MX000017004 2010     1    TMAX NA  NA  NA
## 2 MX000017004 2010     1    TMIN NA  NA  NA
## 3 MX000017004 2010     2    TMAX NA 273 241
## 4 MX000017004 2010     2    TMIN NA 144 144
## 5 MX000017004 2010     3    TMAX NA  NA  NA
## 6 MX000017004 2010     3    TMIN NA  NA  NA
##   d4  d5 d6 d7 d8 d9 d10 d11 d12 d13 d14 d15
## 1 NA  NA NA NA NA NA  NA  NA  NA  NA  NA  NA
## 2 NA  NA NA NA NA NA  NA  NA  NA  NA  NA  NA
## 3 NA  NA NA NA NA NA  NA 297  NA  NA  NA  NA
## 4 NA  NA NA NA NA NA  NA 134  NA  NA  NA  NA
## 5 NA 321 NA NA NA NA 345  NA  NA  NA  NA  NA
## 6 NA 142 NA NA NA NA 168  NA  NA  NA  NA  NA
##   d16 d17 d18 d19 d20 d21 d22 d23 d24 d25
## 1  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA
## 2  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA
## 3  NA  NA  NA  NA  NA  NA  NA 299  NA  NA
## 4  NA  NA  NA  NA  NA  NA  NA 107  NA  NA
## 5 311  NA  NA  NA  NA  NA  NA  NA  NA  NA
## 6 176  NA  NA  NA  NA  NA  NA  NA  NA  NA
##   d26 d27 d28 d29 d30 d31
## 1  NA  NA  NA  NA 278  NA
## 2  NA  NA  NA  NA 145  NA
## 3  NA  NA  NA  NA  NA  NA
## 4  NA  NA  NA  NA  NA  NA
## 5  NA  NA  NA  NA  NA  NA
## 6  NA  NA  NA  NA  NA  NA
```

```
summary(weather)
```

```
##           id           year
## MX000017004:22  Min.      :2010
##                  1st Qu.:2010
##                  Median :2010
##                  Mean    :2010
```

```

##          3rd Qu.:2010
##          Max.    :2010
##
##      month      element      d1
## Min.   : 1.000    TMAX:11   Min.   :138.0
## 1st Qu.: 3.250    TMIN:11   1st Qu.:178.2
## Median : 6.000                Median :218.5
## Mean   : 6.273                Mean   :218.5
## 3rd Qu.: 9.500                3rd Qu.:258.8
## Max.   :12.000                Max.   :299.0
##                                NA's   :20
##      d2          d3
## Min.   :144.0    Min.   :144.0
## 1st Qu.:158.2    1st Qu.:167.2
## Median :218.0    Median :208.0
## Mean   :223.2    Mean   :211.5
## 3rd Qu.:283.0    3rd Qu.:252.2
## Max.   :313.0    Max.   :286.0
## NA's   :18       NA's   :18
##      d4          d5
## Min.   :120      Min.   : 79.0
## 1st Qu.:158      1st Qu.:141.5
## Median :196      Median :210.5
## Mean   :196      Mean   :208.6
## 3rd Qu.:234      3rd Qu.:276.5
## Max.   :272      Max.   :321.0
## NA's   :20       NA's   :14
##      d6          d7
## Min.   :105.0    Min.   :129
## 1st Qu.:148.2    1st Qu.:167
## Median :191.5    Median :205
## Mean   :191.5    Mean   :205
## 3rd Qu.:234.8    3rd Qu.:243
## Max.   :278.0    Max.   :281
## NA's   :20       NA's   :20
##      d8          d9
## Min.   :173.0    Mode:logical
## 1st Qu.:202.2    NA's:22
## Median :231.5
## Mean   :231.5
## 3rd Qu.:260.8
## Max.   :290.0
## NA's   :20
##      d10         d11

```

```

## Min. :168.0 Min. :134.0
## 1st Qu.:212.2 1st Qu.:174.8
## Median :256.5 Median :215.5
## Mean :256.5 Mean :215.5
## 3rd Qu.:300.8 3rd Qu.:256.2
## Max. :345.0 Max. :297.0
## NA's :20 NA's :20
## d12 d13
## Mode:logical Min. :165.0
## NA's:22 1st Qu.:198.2
## Median :231.5
## Mean :231.5
## 3rd Qu.:264.8
## Max. :298.0
## NA's :20
## d14 d15
## Min. :130.0 Min. :105.0
## 1st Qu.:156.2 1st Qu.:150.5
## Median :230.0 Median :196.0
## Mean :222.2 Mean :196.0
## 3rd Qu.:296.0 3rd Qu.:241.5
## Max. :299.0 Max. :287.0
## NA's :18 NA's :20
## d16 d17
## Min. :176.0 Min. :175.0
## 1st Qu.:209.8 1st Qu.:201.2
## Median :243.5 Median :227.5
## Mean :243.5 Mean :227.5
## 3rd Qu.:277.2 3rd Qu.:253.8
## Max. :311.0 Max. :280.0
## NA's :20 NA's :20
## d18 d19
## Mode:logical Mode:logical
## NA's:22 NA's:22
##
##
##
##
## d20 d21
## Mode:logical Mode:logical
## NA's:22 NA's:22
##
##

```

```

##
##
##
##      d22              d23
## Mode:logical  Min.    :107.0
## NA's:22      1st Qu.:139.2
##              Median  :207.0
##              Mean    :205.0
##              3rd Qu.:272.8
##              Max.    :299.0
##              NA's    :18
##      d24              d25
## Mode:logical  Min.    :156.0
## NA's:22      1st Qu.:191.2
##              Median  :226.5
##              Mean    :226.5
##              3rd Qu.:261.8
##              Max.    :297.0
##              NA's    :20
##      d26              d27
## Min.    :121  Min.    :142.0
## 1st Qu.:161  1st Qu.:170.8
## Median :201  Median :229.5
## Mean   :201  Mean   :243.8
## 3rd Qu.:241  3rd Qu.:318.2
## Max.   :281  Max.   :363.0
## NA's   :20   NA's   :16
##      d28              d29
## Min.    :150.0  Min.    :153.0
## 1st Qu.:190.5  1st Qu.:173.2
## Median :231.0  Median :230.0
## Mean   :231.0  Mean   :228.5
## 3rd Qu.:271.5  3rd Qu.:285.2
## Max.   :312.0  Max.   :301.0
## NA's   :20     NA's   :18
##      d30              d31
## Min.    :145.0  Min.    :154
## 1st Qu.:178.2  1st Qu.:179
## Median :211.5  Median :204
## Mean   :211.5  Mean   :204
## 3rd Qu.:244.8  3rd Qu.:229
## Max.   :278.0  Max.   :254
## NA's   :20     NA's   :20

```

(b) Tidy up the weather data such that each observation forms a row and each variable forms a column. You might find the following functions helpful:

- melt
- mutate
- dcast

```
# EDIT ME
weather.tidy <- melt(data = weather, id = c("id",
      "year", "month", "element"), variable.name = "day",
      value.name = "temp", na.rm = TRUE)
```

### Problem 2: Data Manipulation

In this problem we will use the babynames data. Use the data to answer the following questions.

```
# EDIT ME
library(babynames)
library(dplyr)
head(babynames)
```

```
## # A tibble: 6 x 5
##   year  sex   name     n   prop
##   <dbl> <chr>   <chr> <int>   <dbl>
## 1  1880    F    Mary   7065 0.07238359
## 2  1880    F    Anna   2604 0.02667896
## 3  1880    F    Emma   2003 0.02052149
## 4  1880    F Elizabeth 1939 0.01986579
## 5  1880    F   Minnie 1746 0.01788843
## 6  1880    F Margaret 1578 0.01616720
```

(a) What name has been used for the most number of years (when used for a single gender)?

```
# EDIT ME
male <- subset(babynames, sex == "M", select = c(name,
      year, sex))
malenum <- data.frame(table(male$name))
sortedmalenum <- malenum[order(malenum$Freq, decreasing = TRUE),
      ]
topmale <- sortedmalenum[which(sortedmalenum$Freq ==
```

```
max(sortedmalenum$Freq)), ]
topmale$Var1
```

```
## [1] Aaron      Abe         Abel
## [4] Abner      Abraham     Abram
## [7] Adam       Addison     Adrian
## [10] Al         Albert      Alden
## [13] Alex       Alexander   Alfred
## [16] Allan      Allen       Alonzo
## [19] Aloysius   Alphonse    Alton
## [22] Alvin      Ambrose     Amos
## [25] Anderson   Andrew      Andy
## [28] Angus      Anthony     Anton
## [31] Antonio    Archie      Arnold
## [34] Aron       Art         Arthur
## [37] Asa        Aubrey      August
## [40] Augustus   Austin      Avery
## [43] Bailey     Basil       Baxter
## [46] Ben        Benjamin    Benjiman
## [49] Bennett    Bennie      Bernard
## [52] Bert       Bill        Bob
## [55] Boyd       Bruce       Bryant
## [58] Buck       Burton      Buster
## [61] Byron      Caleb       Calvin
## [64] Carey      Carl        Carlos
## [67] Carlton   Carroll     Cary
## [70] Casper     Cecil       Charles
## [73] Charley    Charlie     Chauncey
## [76] Chester    Chris       Christ
## [79] Christian  Christopher  Clarence
## [82] Clark      Claude      Clay
## [85] Clayton   Clement     Cleveland
## [88] Cliff      Clifford    Clifton
## [91] Clint      Clinton     Clyde
## [94] Coleman    Conrad      Cornelius
## [97] Curtis     Cyrus       Dallas
## [100] Dan        Dana        Daniel
## [103] Dave       David       Davis
## [106] Dean       Delbert     Dennis
## [109] Don        Donald      Douglas
## [112] Dudley     Dwight      Earl
## [115] Earnest    Eddie       Edgar
## [118] Edmond     Edmund      Edward
## [121] Edwin      Elbert      Eli
```

## [124]	Elias	Elijah	Elisha
## [127]	Elliott	Ellis	Elmer
## [130]	Elvin	Elwood	Emanuel
## [133]	Emerson	Emery	Emil
## [136]	Emile	Emmett	Emmitt
## [139]	Emory	Enoch	Enos
## [142]	Eric	Ernest	Ervin
## [145]	Erwin	Eugene	Evan
## [148]	Everett	Ezekiel	Ezra
## [151]	Felix	Ferdinand	Fletcher
## [154]	Floyd	Forest	Forrest
## [157]	Foster	Francis	Francisco
## [160]	Frank	Franklin	Fred
## [163]	Frederic	Frederick	Fredrick
## [166]	Freeman	Fritz	Gabriel
## [169]	Garland	Garrett	Gene
## [172]	George	Gerald	Gilbert
## [175]	Glen	Glenn	Gordon
## [178]	Grant	Grover	Gus
## [181]	Gustav	Gustave	Guy
## [184]	Hal	Hamilton	Hans
## [187]	Hardy	Harlan	Harley
## [190]	Harmon	Harold	Harris
## [193]	Harrison	Harry	Harvey
## [196]	Henderson	Henry	Herbert
## [199]	Herman	Herschel	Hiram
## [202]	Hollis	Homer	Horace
## [205]	Hosea	Houston	Howard
## [208]	Hubert	Hugh	Hugo
## [211]	Ike	Ira	Irvin
## [214]	Irving	Irwin	Isaac
## [217]	Isaiah	Isiah	Israel
## [220]	Issac	Ivan	Jack
## [223]	Jackson	Jacob	Jake
## [226]	James	Jason	Jasper
## [229]	Jay	Jean	Jeff
## [232]	Jefferson	Jeremiah	Jerome
## [235]	Jerry	Jess	Jesse
## [238]	Jessie	Jesus	Jim
## [241]	Jimmie	Joe	Joel
## [244]	John	Johnie	Johnnie
## [247]	Johnny	Johnson	Jonas
## [250]	Jonathan	Jose	Joseph
## [253]	Josh	Joshua	Josiah



## [256]	Juan	Judson	Jules
## [259]	Julian	Julius	Junius
## [262]	Karl	Kelly	Kenneth
## [265]	King	Lafayette	Larry
## [268]	Laurence	Lawrence	Lawson
## [271]	Lee	Leland	Lemuel
## [274]	Lenard	Leo	Leon
## [277]	Leonard	Leroy	Leslie
## [280]	Lester	Levi	Levy
## [283]	Lewis	Lindsey	Lloyd
## [286]	Logan	Lonnie	Loren
## [289]	Lorenzo	Louie	Louis
## [292]	Lucian	Lucien	Lucius
## [295]	Luis	Luke	Luther
## [298]	Lyle	Lynn	Mack
## [301]	Major	Malcolm	Manuel
## [304]	Marcus	Marion	Mark
## [307]	Marshall	Martin	Marvin
## [310]	Mason	Mathew	Matt
## [313]	Matthew	Maurice	Max
## [316]	Melvin	Merle	Merritt
## [319]	Michael	Micheal	Mike
## [322]	Miles	Miller	Milo
## [325]	Milton	Mitchell	Monroe
## [328]	Morgan	Morris	Mose
## [331]	Moses	Murray	Myron
## [334]	Napoleon	Nathan	Nathaniel
## [337]	Neal	Ned	Neil
## [340]	Nels	Nelson	Newton
## [343]	Nicholas	Nick	Noah
## [346]	Noble	Noel	Norman
## [349]	Norris	Olin	Oliver
## [352]	Ollie	Omar	Omer
## [355]	Oren	Orin	Orlando
## [358]	Orrin	Orville	Oscar
## [361]	Oswald	Otis	Otto
## [364]	Owen	Parker	Patrick
## [367]	Paul	Pedro	Percy
## [370]	Perry	Pete	Peter
## [373]	Phil	Philip	Phillip
## [376]	Pierce	Porter	Preston
## [379]	Price	Prince	Raleigh
## [382]	Ralph	Ramon	Randolph
## [385]	Ray	Raymond	Reginald

```
## [388] Reuben      Rex      Richard
## [391] Richmond    Riley    Robert
## [394] Rodney      Roger    Roland
## [397] Rolland     Roscoe   Ross
## [400] Roy         Royal    Ruben
## [403] Rudolph     Rufus    Rupert
## [406] Russell     Sam      Sampson
## [409] Samuel      Sandy    Sanford
## [412] Scott       Seth     Shelby
## [415] Sherman     Sidney   Silas
## [418] Simon       Sol      Solomon
## [421] Spencer     Stanley  Stephen
## [424] Sterling    Steve    Steven
## [427] Stewart     Stuart   Sydney
## [430] Sylvester   Taylor   Ted
## [433] Thad        Theo     Theodore
## [436] Thomas      Thurman  Tim
## [439] Timothy     Tom      Tomas
## [442] Tommie      Tommy    Tony
## [445] Troy        Truman   Turner
## [448] Ulysses     Valentine Van
## [451] Vance       Vernon   Victor
## [454] Vincent     Virgil   Wade
## [457] Walker      Wallace  Walter
## [460] Ward        Warner    Warren
## [463] Wayne       Webster   Wesley
## [466] West        Wilber    Wilbert
## [469] Wilbur      Wiley     Wilfred
## [472] Will        Willard   William
## [475] Williams    Willie    Willis
## [478] Wilmer      Wilson    Wyatt
## [481] Zack
## 39199 Levels: Aaban Aabid Aadam ... Zzyzx
```

```
female <- subset(babynames, sex == "F", select = c(name,
  year, sex))
femalenum <- data.frame(table(female$name))
sortedfemalenum <- femalenum[order(femalenum$Freq,
  decreasing = TRUE), ]
topfemale <- sortedfemalenum[which(sortedfemalenum$Freq ==
  max(sortedfemalenum$Freq)), ]
topfemale$Var1
```

```
## [1] Abbie      Abigail    Ada
```

##	[4]	Addie	Adela	Adelaide
##	[7]	Adele	Adelia	Adeline
##	[10]	Adella	Agatha	Agnes
##	[13]	Aimee	Alberta	Alice
##	[16]	Alida	Aline	Allie
##	[19]	Alma	Alta	Althea
##	[22]	Alva	Alvina	Amalia
##	[25]	Amanda	Amelia	America
##	[28]	Amie	Amy	Anastasia
##	[31]	Angela	Angelina	Angeline
##	[34]	Angie	Anita	Ann
##	[37]	Anna	Annabel	Annabelle
##	[40]	Anne	Annetta	Annette
##	[43]	Annie	Antoinette	Antonia
##	[46]	Ara	Augusta	Aurelia
##	[49]	Ava	Barbara	Beatrice
##	[52]	Bella	Belle	Bernice
##	[55]	Berta	Bertha	Bess
##	[58]	Bessie	Betsy	Betty
##	[61]	Blanche	Bonnie	Bridget
##	[64]	Callie	Camilla	Camille
##	[67]	Carolina	Caroline	Carolyn
##	[70]	Carrie	Cassie	Catharine
##	[73]	Catherine	Cathrine	Cecelia
##	[76]	Cecile	Cecilia	Celia
##	[79]	Celina	Charity	Charlotte
##	[82]	Chloe	Christina	Christine
##	[85]	Claire	Clara	Clare
##	[88]	Clarice	Claudia	Cleo
##	[91]	Connie	Constance	Cora
##	[94]	Cordelia	Corinne	Cornelia
##	[97]	Corrie	Corrine	Cynthia
##	[100]	Daisy	Deborah	Delia
##	[103]	Delilah	Della	Delphine
##	[106]	Dena	Dessie	Diana
##	[109]	Dixie	Dolly	Dolores
##	[112]	Donna	Dora	Dorcas
##	[115]	Doris	Dorothea	Dorothy
##	[118]	Edith	Edna	Effie
##	[121]	Elda	Eleanor	Eleanore
##	[124]	Elinor	Elisabeth	Elise
##	[127]	Eliza	Elizabeth	Elizebeth
##	[130]	Ella	Ellen	Ellie
##	[133]	Elma	Elnora	Eloise

## [136]	Elsa	Elsie	Elva
## [139]	Elvira	Emelia	Emilia
## [142]	Emilie	Emily	Emma
## [145]	Emmie	Erma	Estella
## [148]	Estelle	Esther	Ethel
## [151]	Etta	Eugenia	Eunice
## [154]	Eva	Eve	Evelyn
## [157]	Evie	Fannie	Fanny
## [160]	Fay	Faye	Fern
## [163]	Flora	Florence	Frances
## [166]	Francis	Frankie	Freda
## [169]	Frieda	Geneva	Genevieve
## [172]	Georgia	Georgiana	Georgianna
## [175]	Georgie	Geraldine	Gertrude
## [178]	Gladys	Glenna	Goldie
## [181]	Grace	Gracie	Hallie
## [184]	Hanna	Hannah	Harriet
## [187]	Hattie	Hazel	Helen
## [190]	Helena	Helene	Henrietta
## [193]	Hilda	Hope	Ida
## [196]	Ila	Ina	India
## [199]	Inez	Inga	Iona
## [202]	Irene	Iris	Irma
## [205]	Isa	Isabel	Isabell
## [208]	Isabella	Isabelle	Iva
## [211]	Ivy	James	Jane
## [214]	Janet	Janie	Jannie
## [217]	Jean	Jeanette	Jeanne
## [220]	Jeannette	Jennie	Jenny
## [223]	Jesse	Jessica	Jessie
## [226]	Jewel	Joan	Joanna
## [229]	Johanna	John	Johnnie
## [232]	Joseph	Josephine	Josie
## [235]	Juana	Juanita	Judith
## [238]	Julia	Julie	Juliet
## [241]	June	Kate	Katharine
## [244]	Katherine	Katheryn	Kathleen
## [247]	Kathrine	Kathryn	Kathryne
## [250]	Katie	Kattie	Kitty
## [253]	Laura	Lavina	Lavinia
## [256]	Lea	Leah	Leanna
## [259]	Leda	Lee	Leila
## [262]	Lela	Lelia	Lena
## [265]	Lenna	Lenora	Lenore

## [268]	Leona	Leonora	Leora
## [271]	Leslie	Lida	Lila
## [274]	Lilian	Lillian	Lillie
## [277]	Lilly	Lily	Lina
## [280]	Linda	Liza	Lizzie
## [283]	Lois	Lola	Lona
## [286]	Lora	Lorena	Loretta
## [289]	Lottie	Louisa	Louise
## [292]	Lovie	Lucia	Lucie
## [295]	Lucille	Lucinda	Lucy
## [298]	Luella	Lula	Lydia
## [301]	Mabel	Mable	Madeline
## [304]	Mae	Magdalena	Magdalene
## [307]	Maggie	Malinda	Malissa
## [310]	Mamie	Mandy	Manuela
## [313]	Marcella	Marcia	Margaret
## [316]	Margie	Margret	Marguerite
## [319]	Maria	Mariah	Marian
## [322]	Marie	Marietta	Marion
## [325]	Marjorie	Martha	Mary
## [328]	Matilda	Mattie	Maude
## [331]	May	Melinda	Melissa
## [334]	Mildred	Millie	Mina
## [337]	Minerva	Minnie	Miriam
## [340]	Mollie	Molly	Mona
## [343]	Muriel	Myra	Nancy
## [346]	Naomi	Natalie	Nell
## [349]	Nellie	Nettie	Neva
## [352]	Nevada	Nina	Nola
## [355]	Nona	Nora	Norah
## [358]	Norma	Octavia	Odessa
## [361]	Ola	Olga	Olive
## [364]	Olivia	Ollie	Ona
## [367]	Opal	Ophelia	Ora
## [370]	Patsy	Paula	Paulina
## [373]	Pauline	Pearl	Phebe
## [376]	Phoebe	Phyllis	Polly
## [379]	Priscilla	Queen	Rachael
## [382]	Rachel	Rae	Reba
## [385]	Rebecca	Regina	Rena
## [388]	Rhoda	Rita	Robert
## [391]	Roberta	Rosa	Rosalia
## [394]	Rosalie	Rosanna	Rose
## [397]	Rosella	Rosetta	Rosie

```
## [400] Rosina      Rowena      Roxie
## [403] Ruby         Ruth        Sabina
## [406] Sadie        Sallie      Sally
## [409] Samantha    Sara        Sarah
## [412] Savannah    Selena      Selma
## [415] Sena         Serena      Sidney
## [418] Sophia       Sophie      Stella
## [421] Sue          Susan       Susanna
## [424] Susie        Sylvia      Teresa
## [427] Tessie       Theresa     Therese
## [430] Tina         Tommie      Tressa
## [433] Una          Velma       Vera
## [436] Verna        Veronica    Victoria
## [439] Vida         Vina        Viola
## [442] Violet       Virginia    Vivian
## [445] Wanda        Wilhelmina  Willa
## [448] William      Wilma       Winifred
## [451] Winnie       Winona      Zoe
## 64911 Levels: Aabha Aabriella Aaden ... Zyyanna
```

(b) Which name received the largest percentage of any name for any year (consider boy and girl names as distinct)?

```
# EDIT ME
```

(c) Which name recorded in the data set has been out of use for the longest time?

```
# EDIT ME
```

(d) For each year, what is the total number of names that were recorded? Treat boy and girl versions of the same name as two separate names. Did you need to look at the data to answer this question?

```
# EDIT ME
```