Lab 2

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More Basic R Skills

- Create a function `my_reverse` which takes as required input a vector and returns the vector in reverse where the first entry is the last entry, etc. No function calls are allowed inside your function otherwise that would defeat the purpose of the exercise! (Yes, there is a base R function that does this called `rev`). Use `head` on `v` and `tail` on `my_reverse(v)` to verify it works.

```
#tinytex::install_tinytex()
my_rev <- function(v){
  #an array is not the same as a numeric thats why we have to change array to
rep and dim to times so the expect_equals  will work

  v_rev = rep(NA, times= length(v)) #better than filling it with zeros
  for(i in length(v):1){
    v_rev[length(v)-i+1]=v[i]
  }
  v_rev
}
v= 1:10
v

##  [1]  1  2  3  4  5  6  7  8  9 10

my_rev(v)

##  [1] 10  9  8  7  6  5  4  3  2  1
```

- Create a function `flip_matrix` which takes as required input a matrix, an argument `dim_to_rev` that returns the matrix with the rows in reverse order or the columns in reverse order depending on the `dim_to_rev` argument. Let the default be the dimension of the matrix that is greater.

```
flip_matrix = function(x, dim_to_rev = NULL){
  if(is.null(dim_to_rev)){
    dim_to_rev= ifelse(nrow(x) >= ncol(x), "rows", "cols")
  }

  if(dim_to_rev == "rows"){
    x[my_rev(1:nrow(x)),]
  }
  else if(dim_to_rev == "cols"){
    x[,my_rev(1:ncol(x))]
```

```
  }
  else stop("Illegal arg")
}

x = matrix(rnorm(100), nrow= 25)
x
```

```
##              [,1]        [,2]         [,3]       [,4]
##  [1,]  0.80143046 -1.20603266  0.089455212 -0.7364117
##  [2,]  0.58588276  0.16291913 -1.252378638  0.8921378
##  [3,]  0.89120345  0.31665820  0.122221238 -1.8385382
##  [4,] -1.07272160 -0.56504693 -1.426718450  1.6963896
##  [5,] -0.70204181  1.41261736  0.466090532 -0.8449883
##  [6,] -1.36263340  0.68933427  0.985566653 -0.5676955
##  [7,] -0.54516108 -0.82011974  0.493403120 -0.5945455
##  [8,]  2.57481748  0.35370813 -0.140309733  0.3312601
##  [9,]  1.44466028 -0.73312848  1.124102420  1.3139538
## [10,]  0.82042719 -0.86244286  1.252277392 -2.0053255
## [11,]  2.36083111  2.27585632  0.785880885  1.8221576
## [12,]  1.59457121  0.24342519  1.977833412 -0.8249741
## [13,] -0.34200797 -0.34130638 -1.102046714  1.5954741
## [14,] -0.83136802  0.34391517  0.229681491  2.0932874
## [15,]  0.73383871 -0.70488886  1.736927547  1.4328142
## [16,]  0.84917449  0.83345832  0.791159405 -1.1387743
## [17,] -0.59422660  0.14643571 -1.051504508 -0.5208734
## [18,]  0.32453174  0.56055898 -0.004779468 -0.5913953
## [19,]  0.06141947 -1.00229850 -1.881756680  3.2888337
## [20,] -0.04398827  0.24717083 -1.496039015  0.6539298
## [21,]  0.79422375 -0.05001727 -0.775940009  1.9302602
## [22,]  1.82449244  0.96159128  0.585875394  0.1747275
## [23,] -0.90897413 -0.66488184  0.545457573 -0.5879976
## [24,] -0.28552655  0.22253742 -0.411454110 -0.6722295
## [25,] -0.07279267 -0.33365022 -0.183799011 -1.1150529
```

```
flip_matrix(x, dim_to_rev = "cols")
```

```
##              [,1]         [,2]        [,3]        [,4]
##  [1,] -0.7364117  0.089455212 -1.20603266  0.80143046
##  [2,]  0.8921378 -1.252378638  0.16291913  0.58588276
##  [3,] -1.8385382  0.122221238  0.31665820  0.89120345
##  [4,]  1.6963896 -1.426718450 -0.56504693 -1.07272160
##  [5,] -0.8449883  0.466090532  1.41261736 -0.70204181
##  [6,] -0.5676955  0.985566653  0.68933427 -1.36263340
##  [7,] -0.5945455  0.493403120 -0.82011974 -0.54516108
##  [8,]  0.3312601 -0.140309733  0.35370813  2.57481748
##  [9,]  1.3139538  1.124102420 -0.73312848  1.44466028
## [10,] -2.0053255  1.252277392 -0.86244286  0.82042719
## [11,]  1.8221576  0.785880885  2.27585632  2.36083111
## [12,] -0.8249741  1.977833412  0.24342519  1.59457121
## [13,]  1.5954741 -1.102046714 -0.34130638 -0.34200797
```

```
## [14,]  2.0932874  0.229681491  0.34391517 -0.83136802
## [15,]  1.4328142  1.736927547 -0.70488886  0.73383871
## [16,] -1.1387743  0.791159405  0.83345832  0.84917449
## [17,] -0.5208734 -1.051504508  0.14643571 -0.59422660
## [18,] -0.5913953 -0.004779468  0.56055898  0.32453174
## [19,]  3.2888337 -1.881756680 -1.00229850  0.06141947
## [20,]  0.6539298 -1.496039015  0.24717083 -0.04398827
## [21,]  1.9302602 -0.775940009 -0.05001727  0.79422375
## [22,]  0.1747275  0.585875394  0.96159128  1.82449244
## [23,] -0.5879976  0.545457573 -0.66488184 -0.90897413
## [24,] -0.6722295 -0.411454110  0.22253742 -0.28552655
## [25,] -1.1150529 -0.183799011 -0.33365022 -0.07279267
```

- Create a list named `my_list` with keys "A", "B", ... where the entries are arrays of size 1, 2 x 2, 3 x 3 x 3, etc. Fill the array with the numbers 1, 2, 3, etc. Make 8 entries according to this sequence.

```
arrays= list()
#arrays[["A"]]=array(data = 1:4, dim =c(2,2)) #hw
#array(data = 1:27, dim =c(3,3,3))

#hw

#since we have the rep function....
for (i in 1:8) {
 arrays[[LETTERS[i]]] = array(data = (1:i^i), dim=c(rep(i, i)))
}
```

Run the following code:

```
lapply(arrays, object.size) #will grow exponentially
```

```
## $A
## 224 bytes
##
## $B
## 232 bytes
##
## $C
## 352 bytes
##
## $D
## 1248 bytes
##
## $E
## 12744 bytes
##
## $F
## 186864 bytes
##
## $G
```

```
## 3294416 bytes
##
## $H
## 67109104 bytes
```

Use `?object.size` to read about what these functions do. Then explain the output you see above. For the later arrays, does it make sense given the dimensions of the arrays?

As the matrix dim grows exponentially the size of the output also grows very large so it makes sense.

#TO-DO

Now cleanup the namespace by deleting all stored objects and functions:

```
rm(list=ls())
```

A little about strings

- Use the `strsplit` function and `sample` to put the sentences in the string `lorem` below in random order. You will also need to manipulate the output of `strsplit` which is a list. You may need to learn basic concepts of regular expressions.

```
lorem = "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi
posuere varius volutpat. Morbi faucibus ligula id massa ultricies viverra.
Donec vehicula sagittis nisi non semper. Donec at tempor erat. Integer
dapibus mi lectus, eu posuere arcu ultricies in. Cras suscipit id nibh
lacinia elementum. Curabitur est augue, congue eget quam in, scelerisque
semper magna. Aenean nulla ante, iaculis sed vehicula ac, finibus vel arcu.
Mauris at sodales augue. "

sample(unlist(strsplit(lorem,split = "\\.\\ ")))
```

```
##  [1] "Lorem ipsum dolor sit amet, consectetur adipiscing elit"
##  [2] "Cras suscipit id nibh lacinia elementum"
##  [3] "Donec at tempor erat"
##  [4] "Donec vehicula sagittis nisi non semper"
##  [5] "Mauris at sodales augue"
##  [6] "Morbi faucibus ligula id massa ultricies viverra"
##  [7] "Aenean nulla ante, iaculis sed vehicula ac, finibus vel arcu"
##  [8] "Morbi posuere varius volutpat"
##  [9] "Integer dapibus mi lectus, eu posuere arcu ultricies in"
## [10] "Curabitur est augue, congue eget quam in, scelerisque semper magna"
```

```
#sample puts them in random order
```

You have a set of names divided by gender (M / F) and generation (Boomer / GenX / Millenial):

- M / Boomer “Theodore, Bernard, Gene, Herbert, Ray, Tom, Lee, Alfred, Leroy, Eddie”
- M / GenX “Marc, Jamie, Greg, Darryl, Tim, Dean, Jon, Chris, Troy, Jeff”

- M / Millennial “Zachary, Dylan, Christian, Wesley, Seth, Austin, Gabriel, Evan, Casey, Luis”
- F / Boomer “Gloria, Joan, Dorothy, Shirley, Betty, Dianne, Kay, Marjorie, Lorraine, Mildred”
- F / GenX “Tracy, Dawn, Tina, Tammy, Melinda, Tamara, Tracey, Colleen, Sherri, Heidi”
- F / Millennial “Samantha, Alexis, Brittany, Lauren, Taylor, Bethany, Latoya, Candice, Brittney, Cheyenne”

Create a list-within-a-list that will intelligently store this data.

```
#HINT:
#names =strsplit("Theodore, Bernard, Gene, Herbert, Ray, Tom, Lee, Alfred,
Leroy, Eddie", split = ", ")[[1]]

mbommer=strsplit("Theodore, Bernard, Gene, Herbert, Ray, Tom, Lee, Alfred,
Leroy, Eddie",  split = ", ")[[1]]
mgenx= strsplit("Marc, Jamie, Greg, Darryl, Tim, Dean, Jon, Chris, Troy,
Jeff",  split = ", ")[[1]]
mmillennial = strsplit("Zachary, Dylan, Christian, Wesley, Seth, Austin,
Gabriel, Evan, Casey, Luis", split = ", ")[[1]]

fbommer= strsplit( "Gloria, Joan, Dorothy, Shirley, Betty, Dianne, Kay,
Marjorie, Lorraine, Mildred",  split = ", ")[[1]]
fgenx= strsplit("Tracy, Dawn, Tina, Tammy, Melinda, Tamara, Tracey, Colleen,
Sherri, Heidi",  split = ", ")[[1]]
fmillennial = strsplit("Samantha, Alexis, Brittany, Lauren, Taylor, Bethany,
Latoya, Candice, Brittney, Cheyenne",split = ", ")[[1]]

m= list("boomer"=mbommer, "genx" = mgenx, "millennial"=mmillennial)
f =list("boomer"=fbommer, "genx" = fgenx, "millennial"=fmillennial)

female_and_male_genration_list = list("female" =f, "male" =m)
female_and_male_genration_list

## $female
## $female$boomer
##  [1] "Gloria"   "Joan"     "Dorothy"  "Shirley"  "Betty"    "Dianne"
##  [7] "Kay"      "Marjorie" "Lorraine" "Mildred"
##
## $female$genx
##  [1] "Tracy"   "Dawn"    "Tina"    "Tammy"   "Melinda" "Tamara"  "Tracey"
##  [8] "Colleen" "Sherri"  "Heidi"
##
## $female$millennial
##  [1] "Samantha" "Alexis"   "Brittany" "Lauren"   "Taylor"   "Bethany"
##  [7] "Latoya"   "Candice"  "Brittney" "Cheyenne"
##
##
## $male
```

```
## $male$boomer
##  [1] "Theodore" "Bernard"  "Gene"     "Herbert"  "Ray"      "Tom"
##  [7] "Lee"      "Alfred"   "Leroy"    "Eddie"
##
## $male$genx
##  [1] "Marc"   "Jamie"  "Greg"   "Darryl" "Tim"    "Dean"   "Jon"
"Chris"
##  [9] "Troy"   "Jeff"
##
## $male$millennial
##  [1] "Zachary"   "Dylan"     "Christian" "Wesley"    "Seth"      "Austin"
##  [7] "Gabriel"   "Evan"      "Casey"     "Luis"

#TO-DO
```

Dataframe creation

Imagine you are running an experiment with many manipulations. You have 14 levels in the variable "treatment" with levels a, b, c, etc. For each of those manipulations you have 3 submanipulations in a variable named "variation" with levels A, B, C. Then you have "gender" with levels M / F. Then you have "generation" with levels Boomer, GenX, Millenial. Then you will have 6 runs per each of these groups. In each set of 6 you will need to select a name without duplication from the appropriate set of names (from the last question). Create a data frame with columns treatment, variation, gender, generation, name and y that will store all the unique unit information in this experiment. Leave y empty because it will be measured as the experiment is executed.

```
n = 14 * 3 * 2 * 3 * 10
X <- data.frame(treatment = sort(rep(letters[1:14],n/14)))
X$variation <-rep(LETTERS[1:3], n/14/3)
X$gender <-sort(rep(c("Female", "Male"), n/14/3/2))
X$generation<-sort(rep(c("Boomer", "GenX", "Millenial"), n/14/3/3/2))
X$name<-rep(unlist(female_and_male_genration_list), times=14*3)



X

##      treatment variation gender generation      name
## 1            a         A Female     Boomer    Gloria
## 2            a         B Female     Boomer      Joan
## 3            a         C Female     Boomer   Dorothy
## 4            a         A Female     Boomer   Shirley
## 5            a         B Female     Boomer     Betty
## 6            a         C Female     Boomer    Dianne
## 7            a         A Female     Boomer       Kay
## 8            a         B Female     Boomer  Marjorie
## 9            a         C Female     Boomer  Lorraine
## 10           a         A Female     Boomer   Mildred
## 11           a         B Female       GenX     Tracy
```

```
## 12          a         C Female       GenX      Dawn
## 13          a         A Female       GenX      Tina
## 14          a         B Female       GenX     Tammy
## 15          a         C Female       GenX   Melinda
## 16          a         A Female       GenX    Tamara
## 17          a         B Female       GenX    Tracey
## 18          a         C Female       GenX   Colleen
## 19          a         A Female       GenX    Sherri
## 20          a         B Female       GenX     Heidi
## 21          a         C Female  Millenial  Samantha
## 22          a         A Female  Millenial    Alexis
## 23          a         B Female  Millenial  Brittany
## 24          a         C Female  Millenial    Lauren
## 25          a         A Female  Millenial    Taylor
## 26          a         B Female  Millenial   Bethany
## 27          a         C Female  Millenial    Latoya
## 28          a         A Female  Millenial   Candice
## 29          a         B Female  Millenial  Brittney
## 30          a         C Female  Millenial  Cheyenne
## 31          a         A   Male     Boomer  Theodore
## 32          a         B   Male     Boomer   Bernard
## 33          a         C   Male     Boomer      Gene
## 34          a         A   Male     Boomer   Herbert
## 35          a         B   Male     Boomer       Ray
## 36          a         C   Male     Boomer       Tom
## 37          a         A   Male     Boomer       Lee
## 38          a         B   Male     Boomer    Alfred
## 39          a         C   Male     Boomer     Leroy
## 40          a         A   Male     Boomer     Eddie
## 41          a         B   Male       GenX      Marc
## 42          a         C   Male       GenX     Jamie
## 43          a         A   Male       GenX      Greg
## 44          a         B   Male       GenX    Darryl
## 45          a         C   Male       GenX       Tim
## 46          a         A   Male       GenX      Dean
## 47          a         B   Male       GenX       Jon
## 48          a         C   Male       GenX     Chris
## 49          a         A   Male       GenX      Troy
## 50          a         B   Male       GenX      Jeff
## 51          a         C   Male  Millenial   Zachary
## 52          a         A   Male  Millenial     Dylan
## 53          a         B   Male  Millenial Christian
## 54          a         C   Male  Millenial    Wesley
## 55          a         A   Male  Millenial      Seth
## 56          a         B   Male  Millenial    Austin
## 57          a         C   Male  Millenial   Gabriel
## 58          a         A   Male  Millenial      Evan
## 59          a         B   Male  Millenial     Casey
## 60          a         C   Male  Millenial      Luis
## 61          a         A Female     Boomer    Gloria
```

```
## 62          a         B Female     Boomer      Joan
## 63          a         C Female     Boomer   Dorothy
## 64          a         A Female     Boomer   Shirley
## 65          a         B Female     Boomer     Betty
## 66          a         C Female     Boomer    Dianne
## 67          a         A Female     Boomer       Kay
## 68          a         B Female     Boomer  Marjorie
## 69          a         C Female     Boomer  Lorraine
## 70          a         A Female     Boomer   Mildred
## 71          a         B Female       GenX     Tracy
## 72          a         C Female       GenX      Dawn
## 73          a         A Female       GenX      Tina
## 74          a         B Female       GenX     Tammy
## 75          a         C Female       GenX   Melinda
## 76          a         A Female       GenX    Tamara
## 77          a         B Female       GenX    Tracey
## 78          a         C Female       GenX   Colleen
## 79          a         A Female       GenX    Sherri
## 80          a         B Female       GenX     Heidi
## 81          a         C Female  Millenial  Samantha
## 82          a         A Female  Millenial    Alexis
## 83          a         B Female  Millenial  Brittany
## 84          a         C Female  Millenial    Lauren
## 85          a         A Female  Millenial    Taylor
## 86          a         B Female  Millenial   Bethany
## 87          a         C Female  Millenial    Latoya
## 88          a         A Female  Millenial   Candice
## 89          a         B Female  Millenial  Brittney
## 90          a         C Female  Millenial  Cheyenne
## 91          a         A   Male     Boomer  Theodore
## 92          a         B   Male     Boomer   Bernard
## 93          a         C   Male     Boomer      Gene
## 94          a         A   Male     Boomer   Herbert
## 95          a         B   Male     Boomer       Ray
## 96          a         C   Male     Boomer       Tom
## 97          a         A   Male     Boomer       Lee
## 98          a         B   Male     Boomer    Alfred
## 99          a         C   Male     Boomer     Leroy
## 100         a         A   Male     Boomer     Eddie
## 101         a         B   Male       GenX      Marc
## 102         a         C   Male       GenX     Jamie
## 103         a         A   Male       GenX      Greg
## 104         a         B   Male       GenX    Darryl
## 105         a         C   Male       GenX       Tim
## 106         a         A   Male       GenX      Dean
## 107         a         B   Male       GenX       Jon
## 108         a         C   Male       GenX     Chris
## 109         a         A   Male       GenX      Troy
## 110         a         B   Male       GenX      Jeff
## 111         a         C   Male  Millenial   Zachary
```

```
## 112          a         A   Male  Millenial     Dylan
## 113          a         B   Male  Millenial Christian
## 114          a         C   Male  Millenial    Wesley
## 115          a         A   Male  Millenial      Seth
## 116          a         B   Male  Millenial    Austin
## 117          a         C   Male  Millenial   Gabriel
## 118          a         A   Male  Millenial      Evan
## 119          a         B   Male  Millenial     Casey
## 120          a         C   Male  Millenial      Luis
## 121          a         A Female     Boomer    Gloria
## 122          a         B Female     Boomer      Joan
## 123          a         C Female     Boomer   Dorothy
## 124          a         A Female     Boomer   Shirley
## 125          a         B Female     Boomer     Betty
## 126          a         C Female     Boomer    Dianne
## 127          a         A Female     Boomer       Kay
## 128          a         B Female     Boomer  Marjorie
## 129          a         C Female     Boomer  Lorraine
## 130          a         A Female     Boomer   Mildred
## 131          a         B Female       GenX     Tracy
## 132          a         C Female       GenX      Dawn
## 133          a         A Female       GenX      Tina
## 134          a         B Female       GenX     Tammy
## 135          a         C Female       GenX   Melinda
## 136          a         A Female       GenX    Tamara
## 137          a         B Female       GenX    Tracey
## 138          a         C Female       GenX   Colleen
## 139          a         A Female       GenX    Sherri
## 140          a         B Female       GenX     Heidi
## 141          a         C Female  Millenial  Samantha
## 142          a         A Female  Millenial    Alexis
## 143          a         B Female  Millenial  Brittany
## 144          a         C Female  Millenial    Lauren
## 145          a         A Female  Millenial    Taylor
## 146          a         B Female  Millenial   Bethany
## 147          a         C Female  Millenial    Latoya
## 148          a         A Female  Millenial   Candice
## 149          a         B Female  Millenial  Brittney
## 150          a         C Female  Millenial  Cheyenne
## 151          a         A   Male     Boomer  Theodore
## 152          a         B   Male     Boomer   Bernard
## 153          a         C   Male     Boomer      Gene
## 154          a         A   Male     Boomer   Herbert
## 155          a         B   Male     Boomer       Ray
## 156          a         C   Male     Boomer       Tom
## 157          a         A   Male     Boomer       Lee
## 158          a         B   Male     Boomer    Alfred
## 159          a         C   Male     Boomer     Leroy
## 160          a         A   Male     Boomer     Eddie
## 161          a         B   Male       GenX      Marc
```

```
## 162          a         C   Male       GenX     Jamie
## 163          a         A   Male       GenX      Greg
## 164          a         B   Male       GenX    Darryl
## 165          a         C   Male       GenX       Tim
## 166          a         A   Male       GenX      Dean
## 167          a         B   Male       GenX       Jon
## 168          a         C   Male       GenX     Chris
## 169          a         A   Male       GenX      Troy
## 170          a         B   Male       GenX      Jeff
## 171          a         C   Male  Millenial   Zachary
## 172          a         A   Male  Millenial     Dylan
## 173          a         B   Male  Millenial Christian
## 174          a         C   Male  Millenial    Wesley
## 175          a         A   Male  Millenial      Seth
## 176          a         B   Male  Millenial    Austin
## 177          a         C   Male  Millenial   Gabriel
## 178          a         A   Male  Millenial      Evan
## 179          a         B   Male  Millenial     Casey
## 180          a         C   Male  Millenial      Luis
## 181          b         A Female     Boomer    Gloria
## 182          b         B Female     Boomer      Joan
## 183          b         C Female     Boomer   Dorothy
## 184          b         A Female     Boomer   Shirley
## 185          b         B Female     Boomer     Betty
## 186          b         C Female     Boomer    Dianne
## 187          b         A Female     Boomer       Kay
## 188          b         B Female     Boomer  Marjorie
## 189          b         C Female     Boomer  Lorraine
## 190          b         A Female     Boomer   Mildred
## 191          b         B Female       GenX     Tracy
## 192          b         C Female       GenX      Dawn
## 193          b         A Female       GenX      Tina
## 194          b         B Female       GenX     Tammy
## 195          b         C Female       GenX   Melinda
## 196          b         A Female       GenX    Tamara
## 197          b         B Female       GenX    Tracey
## 198          b         C Female       GenX   Colleen
## 199          b         A Female       GenX    Sherri
## 200          b         B Female       GenX     Heidi
## 201          b         C Female  Millenial  Samantha
## 202          b         A Female  Millenial    Alexis
## 203          b         B Female  Millenial  Brittany
## 204          b         C Female  Millenial    Lauren
## 205          b         A Female  Millenial    Taylor
## 206          b         B Female  Millenial   Bethany
## 207          b         C Female  Millenial    Latoya
## 208          b         A Female  Millenial   Candice
## 209          b         B Female  Millenial  Brittney
## 210          b         C Female  Millenial  Cheyenne
## 211          b         A   Male     Boomer  Theodore
```

```
## 212          b         B   Male     Boomer   Bernard
## 213          b         C   Male     Boomer      Gene
## 214          b         A   Male     Boomer   Herbert
## 215          b         B   Male     Boomer       Ray
## 216          b         C   Male     Boomer       Tom
## 217          b         A   Male     Boomer       Lee
## 218          b         B   Male     Boomer    Alfred
## 219          b         C   Male     Boomer     Leroy
## 220          b         A   Male     Boomer     Eddie
## 221          b         B   Male       GenX      Marc
## 222          b         C   Male       GenX     Jamie
## 223          b         A   Male       GenX      Greg
## 224          b         B   Male       GenX    Darryl
## 225          b         C   Male       GenX       Tim
## 226          b         A   Male       GenX      Dean
## 227          b         B   Male       GenX       Jon
## 228          b         C   Male       GenX     Chris
## 229          b         A   Male       GenX      Troy
## 230          b         B   Male       GenX      Jeff
## 231          b         C   Male  Millenial   Zachary
## 232          b         A   Male  Millenial     Dylan
## 233          b         B   Male  Millenial Christian
## 234          b         C   Male  Millenial    Wesley
## 235          b         A   Male  Millenial      Seth
## 236          b         B   Male  Millenial    Austin
## 237          b         C   Male  Millenial   Gabriel
## 238          b         A   Male  Millenial      Evan
## 239          b         B   Male  Millenial     Casey
## 240          b         C   Male  Millenial      Luis
## 241          b         A Female     Boomer    Gloria
## 242          b         B Female     Boomer      Joan
## 243          b         C Female     Boomer   Dorothy
## 244          b         A Female     Boomer   Shirley
## 245          b         B Female     Boomer     Betty
## 246          b         C Female     Boomer    Dianne
## 247          b         A Female     Boomer       Kay
## 248          b         B Female     Boomer  Marjorie
## 249          b         C Female     Boomer  Lorraine
## 250          b         A Female     Boomer   Mildred
## 251          b         B Female       GenX     Tracy
## 252          b         C Female       GenX      Dawn
## 253          b         A Female       GenX      Tina
## 254          b         B Female       GenX     Tammy
## 255          b         C Female       GenX   Melinda
## 256          b         A Female       GenX    Tamara
## 257          b         B Female       GenX    Tracey
## 258          b         C Female       GenX   Colleen
## 259          b         A Female       GenX    Sherri
## 260          b         B Female       GenX     Heidi
## 261          b         C Female  Millenial  Samantha
```

```
## 262          b         A Female  Millenial    Alexis
## 263          b         B Female  Millenial  Brittany
## 264          b         C Female  Millenial    Lauren
## 265          b         A Female  Millenial    Taylor
## 266          b         B Female  Millenial   Bethany
## 267          b         C Female  Millenial    Latoya
## 268          b         A Female  Millenial   Candice
## 269          b         B Female  Millenial  Brittney
## 270          b         C Female  Millenial  Cheyenne
## 271          b         A   Male     Boomer  Theodore
## 272          b         B   Male     Boomer   Bernard
## 273          b         C   Male     Boomer      Gene
## 274          b         A   Male     Boomer   Herbert
## 275          b         B   Male     Boomer       Ray
## 276          b         C   Male     Boomer       Tom
## 277          b         A   Male     Boomer       Lee
## 278          b         B   Male     Boomer    Alfred
## 279          b         C   Male     Boomer     Leroy
## 280          b         A   Male     Boomer     Eddie
## 281          b         B   Male       GenX      Marc
## 282          b         C   Male       GenX     Jamie
## 283          b         A   Male       GenX      Greg
## 284          b         B   Male       GenX    Darryl
## 285          b         C   Male       GenX       Tim
## 286          b         A   Male       GenX      Dean
## 287          b         B   Male       GenX       Jon
## 288          b         C   Male       GenX     Chris
## 289          b         A   Male       GenX      Troy
## 290          b         B   Male       GenX      Jeff
## 291          b         C   Male  Millenial   Zachary
## 292          b         A   Male  Millenial     Dylan
## 293          b         B   Male  Millenial Christian
## 294          b         C   Male  Millenial    Wesley
## 295          b         A   Male  Millenial      Seth
## 296          b         B   Male  Millenial    Austin
## 297          b         C   Male  Millenial   Gabriel
## 298          b         A   Male  Millenial      Evan
## 299          b         B   Male  Millenial     Casey
## 300          b         C   Male  Millenial      Luis
## 301          b         A Female     Boomer    Gloria
## 302          b         B Female     Boomer      Joan
## 303          b         C Female     Boomer   Dorothy
## 304          b         A Female     Boomer   Shirley
## 305          b         B Female     Boomer     Betty
## 306          b         C Female     Boomer    Dianne
## 307          b         A Female     Boomer       Kay
## 308          b         B Female     Boomer  Marjorie
## 309          b         C Female     Boomer  Lorraine
## 310          b         A Female     Boomer   Mildred
## 311          b         B Female       GenX     Tracy
```

```
## 312          b         C Female       GenX      Dawn
## 313          b         A Female       GenX      Tina
## 314          b         B Female       GenX     Tammy
## 315          b         C Female       GenX   Melinda
## 316          b         A Female       GenX    Tamara
## 317          b         B Female       GenX    Tracey
## 318          b         C Female       GenX   Colleen
## 319          b         A Female       GenX    Sherri
## 320          b         B Female       GenX     Heidi
## 321          b         C Female  Millenial  Samantha
## 322          b         A Female  Millenial    Alexis
## 323          b         B Female  Millenial  Brittany
## 324          b         C Female  Millenial    Lauren
## 325          b         A Female  Millenial    Taylor
## 326          b         B Female  Millenial   Bethany
## 327          b         C Female  Millenial    Latoya
## 328          b         A Female  Millenial   Candice
## 329          b         B Female  Millenial  Brittney
## 330          b         C Female  Millenial  Cheyenne
## 331          b         A   Male     Boomer  Theodore
## 332          b         B   Male     Boomer   Bernard
## 333          b         C   Male     Boomer      Gene
## 334          b         A   Male     Boomer   Herbert
## 335          b         B   Male     Boomer       Ray
## 336          b         C   Male     Boomer       Tom
## 337          b         A   Male     Boomer       Lee
## 338          b         B   Male     Boomer    Alfred
## 339          b         C   Male     Boomer     Leroy
## 340          b         A   Male     Boomer     Eddie
## 341          b         B   Male       GenX      Marc
## 342          b         C   Male       GenX     Jamie
## 343          b         A   Male       GenX      Greg
## 344          b         B   Male       GenX    Darryl
## 345          b         C   Male       GenX       Tim
## 346          b         A   Male       GenX      Dean
## 347          b         B   Male       GenX       Jon
## 348          b         C   Male       GenX     Chris
## 349          b         A   Male       GenX      Troy
## 350          b         B   Male       GenX      Jeff
## 351          b         C   Male  Millenial   Zachary
## 352          b         A   Male  Millenial     Dylan
## 353          b         B   Male  Millenial Christian
## 354          b         C   Male  Millenial    Wesley
## 355          b         A   Male  Millenial      Seth
## 356          b         B   Male  Millenial    Austin
## 357          b         C   Male  Millenial   Gabriel
## 358          b         A   Male  Millenial      Evan
## 359          b         B   Male  Millenial     Casey
## 360          b         C   Male  Millenial      Luis
## 361          c         A Female     Boomer    Gloria
```

```
## 362          c         B Female     Boomer      Joan
## 363          c         C Female     Boomer   Dorothy
## 364          c         A Female     Boomer   Shirley
## 365          c         B Female     Boomer     Betty
## 366          c         C Female     Boomer    Dianne
## 367          c         A Female     Boomer       Kay
## 368          c         B Female     Boomer  Marjorie
## 369          c         C Female     Boomer  Lorraine
## 370          c         A Female     Boomer   Mildred
## 371          c         B Female       GenX     Tracy
## 372          c         C Female       GenX      Dawn
## 373          c         A Female       GenX      Tina
## 374          c         B Female       GenX     Tammy
## 375          c         C Female       GenX   Melinda
## 376          c         A Female       GenX    Tamara
## 377          c         B Female       GenX    Tracey
## 378          c         C Female       GenX   Colleen
## 379          c         A Female       GenX    Sherri
## 380          c         B Female       GenX     Heidi
## 381          c         C Female  Millenial  Samantha
## 382          c         A Female  Millenial    Alexis
## 383          c         B Female  Millenial  Brittany
## 384          c         C Female  Millenial    Lauren
## 385          c         A Female  Millenial    Taylor
## 386          c         B Female  Millenial   Bethany
## 387          c         C Female  Millenial    Latoya
## 388          c         A Female  Millenial   Candice
## 389          c         B Female  Millenial  Brittney
## 390          c         C Female  Millenial  Cheyenne
## 391          c         A   Male     Boomer  Theodore
## 392          c         B   Male     Boomer   Bernard
## 393          c         C   Male     Boomer      Gene
## 394          c         A   Male     Boomer   Herbert
## 395          c         B   Male     Boomer       Ray
## 396          c         C   Male     Boomer       Tom
## 397          c         A   Male     Boomer       Lee
## 398          c         B   Male     Boomer    Alfred
## 399          c         C   Male     Boomer     Leroy
## 400          c         A   Male     Boomer     Eddie
## 401          c         B   Male       GenX      Marc
## 402          c         C   Male       GenX     Jamie
## 403          c         A   Male       GenX      Greg
## 404          c         B   Male       GenX    Darryl
## 405          c         C   Male       GenX       Tim
## 406          c         A   Male       GenX      Dean
## 407          c         B   Male       GenX       Jon
## 408          c         C   Male       GenX     Chris
## 409          c         A   Male       GenX      Troy
## 410          c         B   Male       GenX      Jeff
## 411          c         C   Male  Millenial   Zachary
```

```
## 412          c         A   Male  Millenial     Dylan
## 413          c         B   Male  Millenial Christian
## 414          c         C   Male  Millenial    Wesley
## 415          c         A   Male  Millenial      Seth
## 416          c         B   Male  Millenial    Austin
## 417          c         C   Male  Millenial   Gabriel
## 418          c         A   Male  Millenial      Evan
## 419          c         B   Male  Millenial     Casey
## 420          c         C   Male  Millenial      Luis
## 421          c         A Female     Boomer    Gloria
## 422          c         B Female     Boomer      Joan
## 423          c         C Female     Boomer   Dorothy
## 424          c         A Female     Boomer   Shirley
## 425          c         B Female     Boomer     Betty
## 426          c         C Female     Boomer    Dianne
## 427          c         A Female     Boomer       Kay
## 428          c         B Female     Boomer  Marjorie
## 429          c         C Female     Boomer  Lorraine
## 430          c         A Female     Boomer   Mildred
## 431          c         B Female       GenX     Tracy
## 432          c         C Female       GenX      Dawn
## 433          c         A Female       GenX      Tina
## 434          c         B Female       GenX     Tammy
## 435          c         C Female       GenX   Melinda
## 436          c         A Female       GenX    Tamara
## 437          c         B Female       GenX    Tracey
## 438          c         C Female       GenX   Colleen
## 439          c         A Female       GenX    Sherri
## 440          c         B Female       GenX     Heidi
## 441          c         C Female  Millenial  Samantha
## 442          c         A Female  Millenial    Alexis
## 443          c         B Female  Millenial  Brittany
## 444          c         C Female  Millenial    Lauren
## 445          c         A Female  Millenial    Taylor
## 446          c         B Female  Millenial   Bethany
## 447          c         C Female  Millenial    Latoya
## 448          c         A Female  Millenial   Candice
## 449          c         B Female  Millenial  Brittney
## 450          c         C Female  Millenial  Cheyenne
## 451          c         A   Male     Boomer  Theodore
## 452          c         B   Male     Boomer   Bernard
## 453          c         C   Male     Boomer      Gene
## 454          c         A   Male     Boomer   Herbert
## 455          c         B   Male     Boomer       Ray
## 456          c         C   Male     Boomer       Tom
## 457          c         A   Male     Boomer       Lee
## 458          c         B   Male     Boomer    Alfred
## 459          c         C   Male     Boomer     Leroy
## 460          c         A   Male     Boomer     Eddie
## 461          c         B   Male       GenX      Marc
```

```
## 462          c         C   Male       GenX     Jamie
## 463          c         A   Male       GenX      Greg
## 464          c         B   Male       GenX    Darryl
## 465          c         C   Male       GenX       Tim
## 466          c         A   Male       GenX      Dean
## 467          c         B   Male       GenX       Jon
## 468          c         C   Male       GenX     Chris
## 469          c         A   Male       GenX      Troy
## 470          c         B   Male       GenX      Jeff
## 471          c         C   Male  Millenial   Zachary
## 472          c         A   Male  Millenial     Dylan
## 473          c         B   Male  Millenial Christian
## 474          c         C   Male  Millenial    Wesley
## 475          c         A   Male  Millenial      Seth
## 476          c         B   Male  Millenial    Austin
## 477          c         C   Male  Millenial   Gabriel
## 478          c         A   Male  Millenial      Evan
## 479          c         B   Male  Millenial     Casey
## 480          c         C   Male  Millenial      Luis
## 481          c         A Female     Boomer    Gloria
## 482          c         B Female     Boomer      Joan
## 483          c         C Female     Boomer   Dorothy
## 484          c         A Female     Boomer   Shirley
## 485          c         B Female     Boomer     Betty
## 486          c         C Female     Boomer    Dianne
## 487          c         A Female     Boomer       Kay
## 488          c         B Female     Boomer  Marjorie
## 489          c         C Female     Boomer  Lorraine
## 490          c         A Female     Boomer   Mildred
## 491          c         B Female       GenX     Tracy
## 492          c         C Female       GenX      Dawn
## 493          c         A Female       GenX      Tina
## 494          c         B Female       GenX     Tammy
## 495          c         C Female       GenX   Melinda
## 496          c         A Female       GenX    Tamara
## 497          c         B Female       GenX    Tracey
## 498          c         C Female       GenX   Colleen
## 499          c         A Female       GenX    Sherri
## 500          c         B Female       GenX     Heidi
## 501          c         C Female  Millenial  Samantha
## 502          c         A Female  Millenial    Alexis
## 503          c         B Female  Millenial  Brittany
## 504          c         C Female  Millenial    Lauren
## 505          c         A Female  Millenial    Taylor
## 506          c         B Female  Millenial   Bethany
## 507          c         C Female  Millenial    Latoya
## 508          c         A Female  Millenial   Candice
## 509          c         B Female  Millenial  Brittney
## 510          c         C Female  Millenial  Cheyenne
## 511          c         A   Male     Boomer  Theodore
```

```
## 512          c         B   Male     Boomer   Bernard
## 513          c         C   Male     Boomer      Gene
## 514          c         A   Male     Boomer   Herbert
## 515          c         B   Male     Boomer       Ray
## 516          c         C   Male     Boomer       Tom
## 517          c         A   Male     Boomer       Lee
## 518          c         B   Male     Boomer    Alfred
## 519          c         C   Male     Boomer     Leroy
## 520          c         A   Male     Boomer     Eddie
## 521          c         B   Male       GenX      Marc
## 522          c         C   Male       GenX     Jamie
## 523          c         A   Male       GenX      Greg
## 524          c         B   Male       GenX    Darryl
## 525          c         C   Male       GenX       Tim
## 526          c         A   Male       GenX      Dean
## 527          c         B   Male       GenX       Jon
## 528          c         C   Male       GenX     Chris
## 529          c         A   Male       GenX      Troy
## 530          c         B   Male       GenX      Jeff
## 531          c         C   Male  Millenial   Zachary
## 532          c         A   Male  Millenial     Dylan
## 533          c         B   Male  Millenial Christian
## 534          c         C   Male  Millenial    Wesley
## 535          c         A   Male  Millenial      Seth
## 536          c         B   Male  Millenial    Austin
## 537          c         C   Male  Millenial   Gabriel
## 538          c         A   Male  Millenial      Evan
## 539          c         B   Male  Millenial     Casey
## 540          c         C   Male  Millenial      Luis
## 541          d         A Female     Boomer    Gloria
## 542          d         B Female     Boomer      Joan
## 543          d         C Female     Boomer   Dorothy
## 544          d         A Female     Boomer   Shirley
## 545          d         B Female     Boomer     Betty
## 546          d         C Female     Boomer    Dianne
## 547          d         A Female     Boomer       Kay
## 548          d         B Female     Boomer  Marjorie
## 549          d         C Female     Boomer  Lorraine
## 550          d         A Female     Boomer   Mildred
## 551          d         B Female       GenX     Tracy
## 552          d         C Female       GenX      Dawn
## 553          d         A Female       GenX      Tina
## 554          d         B Female       GenX     Tammy
## 555          d         C Female       GenX   Melinda
## 556          d         A Female       GenX    Tamara
## 557          d         B Female       GenX    Tracey
## 558          d         C Female       GenX   Colleen
## 559          d         A Female       GenX    Sherri
## 560          d         B Female       GenX     Heidi
## 561          d         C Female  Millenial  Samantha
```

```
## 562          d         A Female  Millenial    Alexis
## 563          d         B Female  Millenial  Brittany
## 564          d         C Female  Millenial    Lauren
## 565          d         A Female  Millenial    Taylor
## 566          d         B Female  Millenial   Bethany
## 567          d         C Female  Millenial    Latoya
## 568          d         A Female  Millenial   Candice
## 569          d         B Female  Millenial  Brittney
## 570          d         C Female  Millenial  Cheyenne
## 571          d         A   Male     Boomer  Theodore
## 572          d         B   Male     Boomer   Bernard
## 573          d         C   Male     Boomer      Gene
## 574          d         A   Male     Boomer   Herbert
## 575          d         B   Male     Boomer       Ray
## 576          d         C   Male     Boomer       Tom
## 577          d         A   Male     Boomer       Lee
## 578          d         B   Male     Boomer    Alfred
## 579          d         C   Male     Boomer     Leroy
## 580          d         A   Male     Boomer     Eddie
## 581          d         B   Male       GenX      Marc
## 582          d         C   Male       GenX     Jamie
## 583          d         A   Male       GenX      Greg
## 584          d         B   Male       GenX    Darryl
## 585          d         C   Male       GenX       Tim
## 586          d         A   Male       GenX      Dean
## 587          d         B   Male       GenX       Jon
## 588          d         C   Male       GenX     Chris
## 589          d         A   Male       GenX      Troy
## 590          d         B   Male       GenX      Jeff
## 591          d         C   Male  Millenial   Zachary
## 592          d         A   Male  Millenial     Dylan
## 593          d         B   Male  Millenial Christian
## 594          d         C   Male  Millenial    Wesley
## 595          d         A   Male  Millenial      Seth
## 596          d         B   Male  Millenial    Austin
## 597          d         C   Male  Millenial   Gabriel
## 598          d         A   Male  Millenial      Evan
## 599          d         B   Male  Millenial     Casey
## 600          d         C   Male  Millenial      Luis
## 601          d         A Female     Boomer    Gloria
## 602          d         B Female     Boomer      Joan
## 603          d         C Female     Boomer   Dorothy
## 604          d         A Female     Boomer   Shirley
## 605          d         B Female     Boomer     Betty
## 606          d         C Female     Boomer    Dianne
## 607          d         A Female     Boomer       Kay
## 608          d         B Female     Boomer  Marjorie
## 609          d         C Female     Boomer  Lorraine
## 610          d         A Female     Boomer   Mildred
## 611          d         B Female       GenX     Tracy
```

```
## 612          d         C Female       GenX      Dawn
## 613          d         A Female       GenX      Tina
## 614          d         B Female       GenX     Tammy
## 615          d         C Female       GenX   Melinda
## 616          d         A Female       GenX    Tamara
## 617          d         B Female       GenX    Tracey
## 618          d         C Female       GenX   Colleen
## 619          d         A Female       GenX    Sherri
## 620          d         B Female       GenX     Heidi
## 621          d         C Female  Millenial  Samantha
## 622          d         A Female  Millenial    Alexis
## 623          d         B Female  Millenial  Brittany
## 624          d         C Female  Millenial    Lauren
## 625          d         A Female  Millenial    Taylor
## 626          d         B Female  Millenial   Bethany
## 627          d         C Female  Millenial    Latoya
## 628          d         A Female  Millenial   Candice
## 629          d         B Female  Millenial  Brittney
## 630          d         C Female  Millenial  Cheyenne
## 631          d         A   Male     Boomer  Theodore
## 632          d         B   Male     Boomer   Bernard
## 633          d         C   Male     Boomer      Gene
## 634          d         A   Male     Boomer   Herbert
## 635          d         B   Male     Boomer       Ray
## 636          d         C   Male     Boomer       Tom
## 637          d         A   Male     Boomer       Lee
## 638          d         B   Male     Boomer    Alfred
## 639          d         C   Male     Boomer     Leroy
## 640          d         A   Male     Boomer     Eddie
## 641          d         B   Male       GenX      Marc
## 642          d         C   Male       GenX     Jamie
## 643          d         A   Male       GenX      Greg
## 644          d         B   Male       GenX    Darryl
## 645          d         C   Male       GenX       Tim
## 646          d         A   Male       GenX      Dean
## 647          d         B   Male       GenX       Jon
## 648          d         C   Male       GenX     Chris
## 649          d         A   Male       GenX      Troy
## 650          d         B   Male       GenX      Jeff
## 651          d         C   Male  Millenial   Zachary
## 652          d         A   Male  Millenial     Dylan
## 653          d         B   Male  Millenial Christian
## 654          d         C   Male  Millenial    Wesley
## 655          d         A   Male  Millenial      Seth
## 656          d         B   Male  Millenial    Austin
## 657          d         C   Male  Millenial   Gabriel
## 658          d         A   Male  Millenial      Evan
## 659          d         B   Male  Millenial     Casey
## 660          d         C   Male  Millenial      Luis
## 661          d         A Female     Boomer    Gloria
```

```
## 662          d         B Female     Boomer      Joan
## 663          d         C Female     Boomer   Dorothy
## 664          d         A Female     Boomer   Shirley
## 665          d         B Female     Boomer     Betty
## 666          d         C Female     Boomer    Dianne
## 667          d         A Female     Boomer       Kay
## 668          d         B Female     Boomer  Marjorie
## 669          d         C Female     Boomer  Lorraine
## 670          d         A Female     Boomer   Mildred
## 671          d         B Female       GenX     Tracy
## 672          d         C Female       GenX      Dawn
## 673          d         A Female       GenX      Tina
## 674          d         B Female       GenX     Tammy
## 675          d         C Female       GenX   Melinda
## 676          d         A Female       GenX    Tamara
## 677          d         B Female       GenX    Tracey
## 678          d         C Female       GenX   Colleen
## 679          d         A Female       GenX    Sherri
## 680          d         B Female       GenX     Heidi
## 681          d         C Female  Millenial  Samantha
## 682          d         A Female  Millenial    Alexis
## 683          d         B Female  Millenial  Brittany
## 684          d         C Female  Millenial    Lauren
## 685          d         A Female  Millenial    Taylor
## 686          d         B Female  Millenial   Bethany
## 687          d         C Female  Millenial    Latoya
## 688          d         A Female  Millenial   Candice
## 689          d         B Female  Millenial  Brittney
## 690          d         C Female  Millenial  Cheyenne
## 691          d         A   Male     Boomer  Theodore
## 692          d         B   Male     Boomer   Bernard
## 693          d         C   Male     Boomer      Gene
## 694          d         A   Male     Boomer   Herbert
## 695          d         B   Male     Boomer       Ray
## 696          d         C   Male     Boomer       Tom
## 697          d         A   Male     Boomer       Lee
## 698          d         B   Male     Boomer    Alfred
## 699          d         C   Male     Boomer     Leroy
## 700          d         A   Male     Boomer     Eddie
## 701          d         B   Male       GenX      Marc
## 702          d         C   Male       GenX     Jamie
## 703          d         A   Male       GenX      Greg
## 704          d         B   Male       GenX    Darryl
## 705          d         C   Male       GenX       Tim
## 706          d         A   Male       GenX      Dean
## 707          d         B   Male       GenX       Jon
## 708          d         C   Male       GenX     Chris
## 709          d         A   Male       GenX      Troy
## 710          d         B   Male       GenX      Jeff
## 711          d         C   Male  Millenial   Zachary
```

```
## 712          d         A   Male  Millenial     Dylan
## 713          d         B   Male  Millenial Christian
## 714          d         C   Male  Millenial    Wesley
## 715          d         A   Male  Millenial      Seth
## 716          d         B   Male  Millenial    Austin
## 717          d         C   Male  Millenial   Gabriel
## 718          d         A   Male  Millenial      Evan
## 719          d         B   Male  Millenial     Casey
## 720          d         C   Male  Millenial      Luis
## 721          e         A Female     Boomer    Gloria
## 722          e         B Female     Boomer      Joan
## 723          e         C Female     Boomer   Dorothy
## 724          e         A Female     Boomer   Shirley
## 725          e         B Female     Boomer     Betty
## 726          e         C Female     Boomer    Dianne
## 727          e         A Female     Boomer       Kay
## 728          e         B Female     Boomer  Marjorie
## 729          e         C Female     Boomer  Lorraine
## 730          e         A Female     Boomer   Mildred
## 731          e         B Female       GenX     Tracy
## 732          e         C Female       GenX      Dawn
## 733          e         A Female       GenX      Tina
## 734          e         B Female       GenX     Tammy
## 735          e         C Female       GenX   Melinda
## 736          e         A Female       GenX    Tamara
## 737          e         B Female       GenX    Tracey
## 738          e         C Female       GenX   Colleen
## 739          e         A Female       GenX    Sherri
## 740          e         B Female       GenX     Heidi
## 741          e         C Female  Millenial  Samantha
## 742          e         A Female  Millenial    Alexis
## 743          e         B Female  Millenial  Brittany
## 744          e         C Female  Millenial    Lauren
## 745          e         A Female  Millenial    Taylor
## 746          e         B Female  Millenial   Bethany
## 747          e         C Female  Millenial    Latoya
## 748          e         A Female  Millenial   Candice
## 749          e         B Female  Millenial  Brittney
## 750          e         C Female  Millenial  Cheyenne
## 751          e         A   Male     Boomer  Theodore
## 752          e         B   Male     Boomer   Bernard
## 753          e         C   Male     Boomer      Gene
## 754          e         A   Male     Boomer   Herbert
## 755          e         B   Male     Boomer       Ray
## 756          e         C   Male     Boomer       Tom
## 757          e         A   Male     Boomer       Lee
## 758          e         B   Male     Boomer    Alfred
## 759          e         C   Male     Boomer     Leroy
## 760          e         A   Male     Boomer     Eddie
## 761          e         B   Male       GenX      Marc
```

```
## 762          e         C   Male       GenX     Jamie
## 763          e         A   Male       GenX      Greg
## 764          e         B   Male       GenX    Darryl
## 765          e         C   Male       GenX       Tim
## 766          e         A   Male       GenX      Dean
## 767          e         B   Male       GenX       Jon
## 768          e         C   Male       GenX     Chris
## 769          e         A   Male       GenX      Troy
## 770          e         B   Male       GenX      Jeff
## 771          e         C   Male  Millenial   Zachary
## 772          e         A   Male  Millenial     Dylan
## 773          e         B   Male  Millenial Christian
## 774          e         C   Male  Millenial    Wesley
## 775          e         A   Male  Millenial      Seth
## 776          e         B   Male  Millenial    Austin
## 777          e         C   Male  Millenial   Gabriel
## 778          e         A   Male  Millenial      Evan
## 779          e         B   Male  Millenial     Casey
## 780          e         C   Male  Millenial      Luis
## 781          e         A Female     Boomer    Gloria
## 782          e         B Female     Boomer      Joan
## 783          e         C Female     Boomer   Dorothy
## 784          e         A Female     Boomer   Shirley
## 785          e         B Female     Boomer     Betty
## 786          e         C Female     Boomer    Dianne
## 787          e         A Female     Boomer       Kay
## 788          e         B Female     Boomer  Marjorie
## 789          e         C Female     Boomer  Lorraine
## 790          e         A Female     Boomer   Mildred
## 791          e         B Female       GenX     Tracy
## 792          e         C Female       GenX      Dawn
## 793          e         A Female       GenX      Tina
## 794          e         B Female       GenX     Tammy
## 795          e         C Female       GenX   Melinda
## 796          e         A Female       GenX    Tamara
## 797          e         B Female       GenX    Tracey
## 798          e         C Female       GenX   Colleen
## 799          e         A Female       GenX    Sherri
## 800          e         B Female       GenX     Heidi
## 801          e         C Female  Millenial  Samantha
## 802          e         A Female  Millenial    Alexis
## 803          e         B Female  Millenial  Brittany
## 804          e         C Female  Millenial    Lauren
## 805          e         A Female  Millenial    Taylor
## 806          e         B Female  Millenial   Bethany
## 807          e         C Female  Millenial    Latoya
## 808          e         A Female  Millenial   Candice
## 809          e         B Female  Millenial  Brittney
## 810          e         C Female  Millenial  Cheyenne
## 811          e         A   Male     Boomer  Theodore
```

```
## 812          e         B   Male     Boomer   Bernard
## 813          e         C   Male     Boomer      Gene
## 814          e         A   Male     Boomer   Herbert
## 815          e         B   Male     Boomer       Ray
## 816          e         C   Male     Boomer       Tom
## 817          e         A   Male     Boomer       Lee
## 818          e         B   Male     Boomer    Alfred
## 819          e         C   Male     Boomer     Leroy
## 820          e         A   Male     Boomer     Eddie
## 821          e         B   Male       GenX      Marc
## 822          e         C   Male       GenX     Jamie
## 823          e         A   Male       GenX      Greg
## 824          e         B   Male       GenX    Darryl
## 825          e         C   Male       GenX       Tim
## 826          e         A   Male       GenX      Dean
## 827          e         B   Male       GenX       Jon
## 828          e         C   Male       GenX     Chris
## 829          e         A   Male       GenX      Troy
## 830          e         B   Male       GenX      Jeff
## 831          e         C   Male  Millenial   Zachary
## 832          e         A   Male  Millenial     Dylan
## 833          e         B   Male  Millenial Christian
## 834          e         C   Male  Millenial    Wesley
## 835          e         A   Male  Millenial      Seth
## 836          e         B   Male  Millenial    Austin
## 837          e         C   Male  Millenial   Gabriel
## 838          e         A   Male  Millenial      Evan
## 839          e         B   Male  Millenial     Casey
## 840          e         C   Male  Millenial      Luis
## 841          e         A Female     Boomer    Gloria
## 842          e         B Female     Boomer      Joan
## 843          e         C Female     Boomer   Dorothy
## 844          e         A Female     Boomer   Shirley
## 845          e         B Female     Boomer     Betty
## 846          e         C Female     Boomer    Dianne
## 847          e         A Female     Boomer       Kay
## 848          e         B Female     Boomer  Marjorie
## 849          e         C Female     Boomer  Lorraine
## 850          e         A Female     Boomer   Mildred
## 851          e         B Female       GenX     Tracy
## 852          e         C Female       GenX      Dawn
## 853          e         A Female       GenX      Tina
## 854          e         B Female       GenX     Tammy
## 855          e         C Female       GenX   Melinda
## 856          e         A Female       GenX    Tamara
## 857          e         B Female       GenX    Tracey
## 858          e         C Female       GenX   Colleen
## 859          e         A Female       GenX    Sherri
## 860          e         B Female       GenX     Heidi
## 861          e         C Female  Millenial  Samantha
```

```
## 862          e         A Female  Millenial    Alexis
## 863          e         B Female  Millenial  Brittany
## 864          e         C Female  Millenial    Lauren
## 865          e         A Female  Millenial    Taylor
## 866          e         B Female  Millenial   Bethany
## 867          e         C Female  Millenial    Latoya
## 868          e         A Female  Millenial   Candice
## 869          e         B Female  Millenial  Brittney
## 870          e         C Female  Millenial  Cheyenne
## 871          e         A   Male     Boomer  Theodore
## 872          e         B   Male     Boomer   Bernard
## 873          e         C   Male     Boomer      Gene
## 874          e         A   Male     Boomer   Herbert
## 875          e         B   Male     Boomer       Ray
## 876          e         C   Male     Boomer       Tom
## 877          e         A   Male     Boomer       Lee
## 878          e         B   Male     Boomer    Alfred
## 879          e         C   Male     Boomer     Leroy
## 880          e         A   Male     Boomer     Eddie
## 881          e         B   Male       GenX      Marc
## 882          e         C   Male       GenX     Jamie
## 883          e         A   Male       GenX      Greg
## 884          e         B   Male       GenX    Darryl
## 885          e         C   Male       GenX       Tim
## 886          e         A   Male       GenX      Dean
## 887          e         B   Male       GenX       Jon
## 888          e         C   Male       GenX     Chris
## 889          e         A   Male       GenX      Troy
## 890          e         B   Male       GenX      Jeff
## 891          e         C   Male  Millenial   Zachary
## 892          e         A   Male  Millenial     Dylan
## 893          e         B   Male  Millenial Christian
## 894          e         C   Male  Millenial    Wesley
## 895          e         A   Male  Millenial      Seth
## 896          e         B   Male  Millenial    Austin
## 897          e         C   Male  Millenial   Gabriel
## 898          e         A   Male  Millenial      Evan
## 899          e         B   Male  Millenial     Casey
## 900          e         C   Male  Millenial      Luis
## 901          f         A Female     Boomer    Gloria
## 902          f         B Female     Boomer      Joan
## 903          f         C Female     Boomer   Dorothy
## 904          f         A Female     Boomer   Shirley
## 905          f         B Female     Boomer     Betty
## 906          f         C Female     Boomer    Dianne
## 907          f         A Female     Boomer       Kay
## 908          f         B Female     Boomer  Marjorie
## 909          f         C Female     Boomer  Lorraine
## 910          f         A Female     Boomer   Mildred
## 911          f         B Female       GenX     Tracy
```

```
## 912          f         C Female       GenX      Dawn
## 913          f         A Female       GenX      Tina
## 914          f         B Female       GenX     Tammy
## 915          f         C Female       GenX   Melinda
## 916          f         A Female       GenX    Tamara
## 917          f         B Female       GenX    Tracey
## 918          f         C Female       GenX   Colleen
## 919          f         A Female       GenX    Sherri
## 920          f         B Female       GenX     Heidi
## 921          f         C Female  Millenial  Samantha
## 922          f         A Female  Millenial    Alexis
## 923          f         B Female  Millenial  Brittany
## 924          f         C Female  Millenial    Lauren
## 925          f         A Female  Millenial    Taylor
## 926          f         B Female  Millenial   Bethany
## 927          f         C Female  Millenial    Latoya
## 928          f         A Female  Millenial   Candice
## 929          f         B Female  Millenial  Brittney
## 930          f         C Female  Millenial  Cheyenne
## 931          f         A   Male     Boomer  Theodore
## 932          f         B   Male     Boomer   Bernard
## 933          f         C   Male     Boomer      Gene
## 934          f         A   Male     Boomer   Herbert
## 935          f         B   Male     Boomer       Ray
## 936          f         C   Male     Boomer       Tom
## 937          f         A   Male     Boomer       Lee
## 938          f         B   Male     Boomer    Alfred
## 939          f         C   Male     Boomer     Leroy
## 940          f         A   Male     Boomer     Eddie
## 941          f         B   Male       GenX      Marc
## 942          f         C   Male       GenX     Jamie
## 943          f         A   Male       GenX      Greg
## 944          f         B   Male       GenX    Darryl
## 945          f         C   Male       GenX       Tim
## 946          f         A   Male       GenX      Dean
## 947          f         B   Male       GenX       Jon
## 948          f         C   Male       GenX     Chris
## 949          f         A   Male       GenX      Troy
## 950          f         B   Male       GenX      Jeff
## 951          f         C   Male  Millenial   Zachary
## 952          f         A   Male  Millenial     Dylan
## 953          f         B   Male  Millenial Christian
## 954          f         C   Male  Millenial    Wesley
## 955          f         A   Male  Millenial      Seth
## 956          f         B   Male  Millenial    Austin
## 957          f         C   Male  Millenial   Gabriel
## 958          f         A   Male  Millenial      Evan
## 959          f         B   Male  Millenial     Casey
## 960          f         C   Male  Millenial      Luis
## 961          f         A Female     Boomer    Gloria
```

```
## 962          f         B Female     Boomer      Joan
## 963          f         C Female     Boomer   Dorothy
## 964          f         A Female     Boomer   Shirley
## 965          f         B Female     Boomer     Betty
## 966          f         C Female     Boomer    Dianne
## 967          f         A Female     Boomer       Kay
## 968          f         B Female     Boomer  Marjorie
## 969          f         C Female     Boomer  Lorraine
## 970          f         A Female     Boomer   Mildred
## 971          f         B Female       GenX     Tracy
## 972          f         C Female       GenX      Dawn
## 973          f         A Female       GenX      Tina
## 974          f         B Female       GenX     Tammy
## 975          f         C Female       GenX   Melinda
## 976          f         A Female       GenX    Tamara
## 977          f         B Female       GenX    Tracey
## 978          f         C Female       GenX   Colleen
## 979          f         A Female       GenX    Sherri
## 980          f         B Female       GenX     Heidi
## 981          f         C Female  Millenial  Samantha
## 982          f         A Female  Millenial    Alexis
## 983          f         B Female  Millenial  Brittany
## 984          f         C Female  Millenial    Lauren
## 985          f         A Female  Millenial    Taylor
## 986          f         B Female  Millenial   Bethany
## 987          f         C Female  Millenial    Latoya
## 988          f         A Female  Millenial   Candice
## 989          f         B Female  Millenial  Brittney
## 990          f         C Female  Millenial  Cheyenne
## 991          f         A   Male     Boomer  Theodore
## 992          f         B   Male     Boomer   Bernard
## 993          f         C   Male     Boomer      Gene
## 994          f         A   Male     Boomer   Herbert
## 995          f         B   Male     Boomer       Ray
## 996          f         C   Male     Boomer       Tom
## 997          f         A   Male     Boomer       Lee
## 998          f         B   Male     Boomer    Alfred
## 999          f         C   Male     Boomer     Leroy
## 1000         f         A   Male     Boomer     Eddie
## 1001         f         B   Male       GenX      Marc
## 1002         f         C   Male       GenX     Jamie
## 1003         f         A   Male       GenX      Greg
## 1004         f         B   Male       GenX    Darryl
## 1005         f         C   Male       GenX       Tim
## 1006         f         A   Male       GenX      Dean
## 1007         f         B   Male       GenX       Jon
## 1008         f         C   Male       GenX     Chris
## 1009         f         A   Male       GenX      Troy
## 1010         f         B   Male       GenX      Jeff
## 1011         f         C   Male  Millenial   Zachary
```

```
## 1012         f         A   Male  Millenial     Dylan
## 1013         f         B   Male  Millenial Christian
## 1014         f         C   Male  Millenial    Wesley
## 1015         f         A   Male  Millenial      Seth
## 1016         f         B   Male  Millenial    Austin
## 1017         f         C   Male  Millenial   Gabriel
## 1018         f         A   Male  Millenial      Evan
## 1019         f         B   Male  Millenial     Casey
## 1020         f         C   Male  Millenial      Luis
## 1021         f         A Female     Boomer    Gloria
## 1022         f         B Female     Boomer      Joan
## 1023         f         C Female     Boomer   Dorothy
## 1024         f         A Female     Boomer   Shirley
## 1025         f         B Female     Boomer     Betty
## 1026         f         C Female     Boomer    Dianne
## 1027         f         A Female     Boomer       Kay
## 1028         f         B Female     Boomer  Marjorie
## 1029         f         C Female     Boomer  Lorraine
## 1030         f         A Female     Boomer   Mildred
## 1031         f         B Female       GenX     Tracy
## 1032         f         C Female       GenX      Dawn
## 1033         f         A Female       GenX      Tina
## 1034         f         B Female       GenX     Tammy
## 1035         f         C Female       GenX   Melinda
## 1036         f         A Female       GenX    Tamara
## 1037         f         B Female       GenX    Tracey
## 1038         f         C Female       GenX   Colleen
## 1039         f         A Female       GenX    Sherri
## 1040         f         B Female       GenX     Heidi
## 1041         f         C Female  Millenial  Samantha
## 1042         f         A Female  Millenial    Alexis
## 1043         f         B Female  Millenial  Brittany
## 1044         f         C Female  Millenial    Lauren
## 1045         f         A Female  Millenial    Taylor
## 1046         f         B Female  Millenial   Bethany
## 1047         f         C Female  Millenial    Latoya
## 1048         f         A Female  Millenial   Candice
## 1049         f         B Female  Millenial  Brittney
## 1050         f         C Female  Millenial  Cheyenne
## 1051         f         A   Male     Boomer  Theodore
## 1052         f         B   Male     Boomer   Bernard
## 1053         f         C   Male     Boomer      Gene
## 1054         f         A   Male     Boomer   Herbert
## 1055         f         B   Male     Boomer       Ray
## 1056         f         C   Male     Boomer       Tom
## 1057         f         A   Male     Boomer       Lee
## 1058         f         B   Male     Boomer    Alfred
## 1059         f         C   Male     Boomer     Leroy
## 1060         f         A   Male     Boomer     Eddie
## 1061         f         B   Male       GenX      Marc
```

```
## 1062         f         C   Male       GenX     Jamie
## 1063         f         A   Male       GenX      Greg
## 1064         f         B   Male       GenX    Darryl
## 1065         f         C   Male       GenX       Tim
## 1066         f         A   Male       GenX      Dean
## 1067         f         B   Male       GenX       Jon
## 1068         f         C   Male       GenX     Chris
## 1069         f         A   Male       GenX      Troy
## 1070         f         B   Male       GenX      Jeff
## 1071         f         C   Male  Millenial   Zachary
## 1072         f         A   Male  Millenial     Dylan
## 1073         f         B   Male  Millenial Christian
## 1074         f         C   Male  Millenial    Wesley
## 1075         f         A   Male  Millenial      Seth
## 1076         f         B   Male  Millenial    Austin
## 1077         f         C   Male  Millenial   Gabriel
## 1078         f         A   Male  Millenial      Evan
## 1079         f         B   Male  Millenial     Casey
## 1080         f         C   Male  Millenial      Luis
## 1081         g         A Female     Boomer    Gloria
## 1082         g         B Female     Boomer      Joan
## 1083         g         C Female     Boomer   Dorothy
## 1084         g         A Female     Boomer   Shirley
## 1085         g         B Female     Boomer     Betty
## 1086         g         C Female     Boomer    Dianne
## 1087         g         A Female     Boomer       Kay
## 1088         g         B Female     Boomer  Marjorie
## 1089         g         C Female     Boomer  Lorraine
## 1090         g         A Female     Boomer   Mildred
## 1091         g         B Female       GenX     Tracy
## 1092         g         C Female       GenX      Dawn
## 1093         g         A Female       GenX      Tina
## 1094         g         B Female       GenX     Tammy
## 1095         g         C Female       GenX   Melinda
## 1096         g         A Female       GenX    Tamara
## 1097         g         B Female       GenX    Tracey
## 1098         g         C Female       GenX   Colleen
## 1099         g         A Female       GenX    Sherri
## 1100         g         B Female       GenX     Heidi
## 1101         g         C Female  Millenial  Samantha
## 1102         g         A Female  Millenial    Alexis
## 1103         g         B Female  Millenial  Brittany
## 1104         g         C Female  Millenial    Lauren
## 1105         g         A Female  Millenial    Taylor
## 1106         g         B Female  Millenial   Bethany
## 1107         g         C Female  Millenial    Latoya
## 1108         g         A Female  Millenial   Candice
## 1109         g         B Female  Millenial  Brittney
## 1110         g         C Female  Millenial  Cheyenne
## 1111         g         A   Male     Boomer  Theodore
```

```
## 1112         g         B   Male     Boomer   Bernard
## 1113         g         C   Male     Boomer      Gene
## 1114         g         A   Male     Boomer   Herbert
## 1115         g         B   Male     Boomer       Ray
## 1116         g         C   Male     Boomer       Tom
## 1117         g         A   Male     Boomer       Lee
## 1118         g         B   Male     Boomer    Alfred
## 1119         g         C   Male     Boomer     Leroy
## 1120         g         A   Male     Boomer     Eddie
## 1121         g         B   Male       GenX      Marc
## 1122         g         C   Male       GenX     Jamie
## 1123         g         A   Male       GenX      Greg
## 1124         g         B   Male       GenX    Darryl
## 1125         g         C   Male       GenX       Tim
## 1126         g         A   Male       GenX      Dean
## 1127         g         B   Male       GenX       Jon
## 1128         g         C   Male       GenX     Chris
## 1129         g         A   Male       GenX      Troy
## 1130         g         B   Male       GenX      Jeff
## 1131         g         C   Male  Millenial   Zachary
## 1132         g         A   Male  Millenial     Dylan
## 1133         g         B   Male  Millenial Christian
## 1134         g         C   Male  Millenial    Wesley
## 1135         g         A   Male  Millenial      Seth
## 1136         g         B   Male  Millenial    Austin
## 1137         g         C   Male  Millenial   Gabriel
## 1138         g         A   Male  Millenial      Evan
## 1139         g         B   Male  Millenial     Casey
## 1140         g         C   Male  Millenial      Luis
## 1141         g         A Female     Boomer    Gloria
## 1142         g         B Female     Boomer      Joan
## 1143         g         C Female     Boomer   Dorothy
## 1144         g         A Female     Boomer   Shirley
## 1145         g         B Female     Boomer     Betty
## 1146         g         C Female     Boomer    Dianne
## 1147         g         A Female     Boomer       Kay
## 1148         g         B Female     Boomer  Marjorie
## 1149         g         C Female     Boomer  Lorraine
## 1150         g         A Female     Boomer   Mildred
## 1151         g         B Female       GenX     Tracy
## 1152         g         C Female       GenX      Dawn
## 1153         g         A Female       GenX      Tina
## 1154         g         B Female       GenX     Tammy
## 1155         g         C Female       GenX   Melinda
## 1156         g         A Female       GenX    Tamara
## 1157         g         B Female       GenX    Tracey
## 1158         g         C Female       GenX   Colleen
## 1159         g         A Female       GenX    Sherri
## 1160         g         B Female       GenX     Heidi
## 1161         g         C Female  Millenial  Samantha
```

```
## 1162         g         A Female  Millenial    Alexis
## 1163         g         B Female  Millenial  Brittany
## 1164         g         C Female  Millenial    Lauren
## 1165         g         A Female  Millenial    Taylor
## 1166         g         B Female  Millenial   Bethany
## 1167         g         C Female  Millenial    Latoya
## 1168         g         A Female  Millenial   Candice
## 1169         g         B Female  Millenial  Brittney
## 1170         g         C Female  Millenial  Cheyenne
## 1171         g         A   Male     Boomer  Theodore
## 1172         g         B   Male     Boomer   Bernard
## 1173         g         C   Male     Boomer      Gene
## 1174         g         A   Male     Boomer   Herbert
## 1175         g         B   Male     Boomer       Ray
## 1176         g         C   Male     Boomer       Tom
## 1177         g         A   Male     Boomer       Lee
## 1178         g         B   Male     Boomer    Alfred
## 1179         g         C   Male     Boomer     Leroy
## 1180         g         A   Male     Boomer     Eddie
## 1181         g         B   Male       GenX      Marc
## 1182         g         C   Male       GenX     Jamie
## 1183         g         A   Male       GenX      Greg
## 1184         g         B   Male       GenX    Darryl
## 1185         g         C   Male       GenX       Tim
## 1186         g         A   Male       GenX      Dean
## 1187         g         B   Male       GenX       Jon
## 1188         g         C   Male       GenX     Chris
## 1189         g         A   Male       GenX      Troy
## 1190         g         B   Male       GenX      Jeff
## 1191         g         C   Male  Millenial   Zachary
## 1192         g         A   Male  Millenial     Dylan
## 1193         g         B   Male  Millenial Christian
## 1194         g         C   Male  Millenial    Wesley
## 1195         g         A   Male  Millenial      Seth
## 1196         g         B   Male  Millenial    Austin
## 1197         g         C   Male  Millenial   Gabriel
## 1198         g         A   Male  Millenial      Evan
## 1199         g         B   Male  Millenial     Casey
## 1200         g         C   Male  Millenial      Luis
## 1201         g         A Female     Boomer    Gloria
## 1202         g         B Female     Boomer      Joan
## 1203         g         C Female     Boomer   Dorothy
## 1204         g         A Female     Boomer   Shirley
## 1205         g         B Female     Boomer     Betty
## 1206         g         C Female     Boomer    Dianne
## 1207         g         A Female     Boomer       Kay
## 1208         g         B Female     Boomer  Marjorie
## 1209         g         C Female     Boomer  Lorraine
## 1210         g         A Female     Boomer   Mildred
## 1211         g         B Female       GenX     Tracy
```

```
## 1212         g         C Female       GenX      Dawn
## 1213         g         A Female       GenX      Tina
## 1214         g         B Female       GenX     Tammy
## 1215         g         C Female       GenX   Melinda
## 1216         g         A Female       GenX    Tamara
## 1217         g         B Female       GenX    Tracey
## 1218         g         C Female       GenX   Colleen
## 1219         g         A Female       GenX    Sherri
## 1220         g         B Female       GenX     Heidi
## 1221         g         C Female  Millenial  Samantha
## 1222         g         A Female  Millenial    Alexis
## 1223         g         B Female  Millenial  Brittany
## 1224         g         C Female  Millenial    Lauren
## 1225         g         A Female  Millenial    Taylor
## 1226         g         B Female  Millenial   Bethany
## 1227         g         C Female  Millenial    Latoya
## 1228         g         A Female  Millenial   Candice
## 1229         g         B Female  Millenial  Brittney
## 1230         g         C Female  Millenial  Cheyenne
## 1231         g         A   Male     Boomer  Theodore
## 1232         g         B   Male     Boomer   Bernard
## 1233         g         C   Male     Boomer      Gene
## 1234         g         A   Male     Boomer   Herbert
## 1235         g         B   Male     Boomer       Ray
## 1236         g         C   Male     Boomer       Tom
## 1237         g         A   Male     Boomer       Lee
## 1238         g         B   Male     Boomer    Alfred
## 1239         g         C   Male     Boomer     Leroy
## 1240         g         A   Male     Boomer     Eddie
## 1241         g         B   Male       GenX      Marc
## 1242         g         C   Male       GenX     Jamie
## 1243         g         A   Male       GenX      Greg
## 1244         g         B   Male       GenX    Darryl
## 1245         g         C   Male       GenX       Tim
## 1246         g         A   Male       GenX      Dean
## 1247         g         B   Male       GenX       Jon
## 1248         g         C   Male       GenX     Chris
## 1249         g         A   Male       GenX      Troy
## 1250         g         B   Male       GenX      Jeff
## 1251         g         C   Male  Millenial   Zachary
## 1252         g         A   Male  Millenial     Dylan
## 1253         g         B   Male  Millenial Christian
## 1254         g         C   Male  Millenial    Wesley
## 1255         g         A   Male  Millenial      Seth
## 1256         g         B   Male  Millenial    Austin
## 1257         g         C   Male  Millenial   Gabriel
## 1258         g         A   Male  Millenial      Evan
## 1259         g         B   Male  Millenial     Casey
## 1260         g         C   Male  Millenial      Luis
## 1261         h         A Female     Boomer    Gloria
```

```
## 1262         h         B Female     Boomer      Joan
## 1263         h         C Female     Boomer   Dorothy
## 1264         h         A Female     Boomer   Shirley
## 1265         h         B Female     Boomer     Betty
## 1266         h         C Female     Boomer    Dianne
## 1267         h         A Female     Boomer       Kay
## 1268         h         B Female     Boomer  Marjorie
## 1269         h         C Female     Boomer  Lorraine
## 1270         h         A Female     Boomer   Mildred
## 1271         h         B Female       GenX     Tracy
## 1272         h         C Female       GenX      Dawn
## 1273         h         A Female       GenX      Tina
## 1274         h         B Female       GenX     Tammy
## 1275         h         C Female       GenX   Melinda
## 1276         h         A Female       GenX    Tamara
## 1277         h         B Female       GenX    Tracey
## 1278         h         C Female       GenX   Colleen
## 1279         h         A Female       GenX    Sherri
## 1280         h         B Female       GenX     Heidi
## 1281         h         C Female  Millenial  Samantha
## 1282         h         A Female  Millenial    Alexis
## 1283         h         B Female  Millenial  Brittany
## 1284         h         C Female  Millenial    Lauren
## 1285         h         A Female  Millenial    Taylor
## 1286         h         B Female  Millenial   Bethany
## 1287         h         C Female  Millenial    Latoya
## 1288         h         A Female  Millenial   Candice
## 1289         h         B Female  Millenial  Brittney
## 1290         h         C Female  Millenial  Cheyenne
## 1291         h         A   Male     Boomer  Theodore
## 1292         h         B   Male     Boomer   Bernard
## 1293         h         C   Male     Boomer      Gene
## 1294         h         A   Male     Boomer   Herbert
## 1295         h         B   Male     Boomer       Ray
## 1296         h         C   Male     Boomer       Tom
## 1297         h         A   Male     Boomer       Lee
## 1298         h         B   Male     Boomer    Alfred
## 1299         h         C   Male     Boomer     Leroy
## 1300         h         A   Male     Boomer     Eddie
## 1301         h         B   Male       GenX      Marc
## 1302         h         C   Male       GenX     Jamie
## 1303         h         A   Male       GenX      Greg
## 1304         h         B   Male       GenX    Darryl
## 1305         h         C   Male       GenX       Tim
## 1306         h         A   Male       GenX      Dean
## 1307         h         B   Male       GenX       Jon
## 1308         h         C   Male       GenX     Chris
## 1309         h         A   Male       GenX      Troy
## 1310         h         B   Male       GenX      Jeff
## 1311         h         C   Male  Millenial   Zachary
```

```
## 1312         h         A   Male  Millenial     Dylan
## 1313         h         B   Male  Millenial Christian
## 1314         h         C   Male  Millenial    Wesley
## 1315         h         A   Male  Millenial      Seth
## 1316         h         B   Male  Millenial    Austin
## 1317         h         C   Male  Millenial   Gabriel
## 1318         h         A   Male  Millenial      Evan
## 1319         h         B   Male  Millenial     Casey
## 1320         h         C   Male  Millenial      Luis
## 1321         h         A Female     Boomer    Gloria
## 1322         h         B Female     Boomer      Joan
## 1323         h         C Female     Boomer   Dorothy
## 1324         h         A Female     Boomer   Shirley
## 1325         h         B Female     Boomer     Betty
## 1326         h         C Female     Boomer    Dianne
## 1327         h         A Female     Boomer       Kay
## 1328         h         B Female     Boomer  Marjorie
## 1329         h         C Female     Boomer  Lorraine
## 1330         h         A Female     Boomer   Mildred
## 1331         h         B Female       GenX     Tracy
## 1332         h         C Female       GenX      Dawn
## 1333         h         A Female       GenX      Tina
## 1334         h         B Female       GenX     Tammy
## 1335         h         C Female       GenX   Melinda
## 1336         h         A Female       GenX    Tamara
## 1337         h         B Female       GenX    Tracey
## 1338         h         C Female       GenX   Colleen
## 1339         h         A Female       GenX    Sherri
## 1340         h         B Female       GenX     Heidi
## 1341         h         C Female  Millenial  Samantha
## 1342         h         A Female  Millenial    Alexis
## 1343         h         B Female  Millenial  Brittany
## 1344         h         C Female  Millenial    Lauren
## 1345         h         A Female  Millenial    Taylor
## 1346         h         B Female  Millenial   Bethany
## 1347         h         C Female  Millenial    Latoya
## 1348         h         A Female  Millenial   Candice
## 1349         h         B Female  Millenial  Brittney
## 1350         h         C Female  Millenial  Cheyenne
## 1351         h         A   Male     Boomer  Theodore
## 1352         h         B   Male     Boomer   Bernard
## 1353         h         C   Male     Boomer      Gene
## 1354         h         A   Male     Boomer   Herbert
## 1355         h         B   Male     Boomer       Ray
## 1356         h         C   Male     Boomer       Tom
## 1357         h         A   Male     Boomer       Lee
## 1358         h         B   Male     Boomer    Alfred
## 1359         h         C   Male     Boomer     Leroy
## 1360         h         A   Male     Boomer     Eddie
## 1361         h         B   Male       GenX      Marc
```

```
## 1362         h         C   Male       GenX     Jamie
## 1363         h         A   Male       GenX      Greg
## 1364         h         B   Male       GenX    Darryl
## 1365         h         C   Male       GenX       Tim
## 1366         h         A   Male       GenX      Dean
## 1367         h         B   Male       GenX       Jon
## 1368         h         C   Male       GenX     Chris
## 1369         h         A   Male       GenX      Troy
## 1370         h         B   Male       GenX      Jeff
## 1371         h         C   Male  Millenial   Zachary
## 1372         h         A   Male  Millenial     Dylan
## 1373         h         B   Male  Millenial Christian
## 1374         h         C   Male  Millenial    Wesley
## 1375         h         A   Male  Millenial      Seth
## 1376         h         B   Male  Millenial    Austin
## 1377         h         C   Male  Millenial   Gabriel
## 1378         h         A   Male  Millenial      Evan
## 1379         h         B   Male  Millenial     Casey
## 1380         h         C   Male  Millenial      Luis
## 1381         h         A Female     Boomer    Gloria
## 1382         h         B Female     Boomer      Joan
## 1383         h         C Female     Boomer   Dorothy
## 1384         h         A Female     Boomer   Shirley
## 1385         h         B Female     Boomer     Betty
## 1386         h         C Female     Boomer    Dianne
## 1387         h         A Female     Boomer       Kay
## 1388         h         B Female     Boomer  Marjorie
## 1389         h         C Female     Boomer  Lorraine
## 1390         h         A Female     Boomer   Mildred
## 1391         h         B Female       GenX     Tracy
## 1392         h         C Female       GenX      Dawn
## 1393         h         A Female       GenX      Tina
## 1394         h         B Female       GenX     Tammy
## 1395         h         C Female       GenX   Melinda
## 1396         h         A Female       GenX    Tamara
## 1397         h         B Female       GenX    Tracey
## 1398         h         C Female       GenX   Colleen
## 1399         h         A Female       GenX    Sherri
## 1400         h         B Female       GenX     Heidi
## 1401         h         C Female  Millenial  Samantha
## 1402         h         A Female  Millenial    Alexis
## 1403         h         B Female  Millenial  Brittany
## 1404         h         C Female  Millenial    Lauren
## 1405         h         A Female  Millenial    Taylor
## 1406         h         B Female  Millenial   Bethany
## 1407         h         C Female  Millenial    Latoya
## 1408         h         A Female  Millenial   Candice
## 1409         h         B Female  Millenial  Brittney
## 1410         h         C Female  Millenial  Cheyenne
## 1411         h         A   Male     Boomer  Theodore
```

```
## 1412         h         B   Male     Boomer   Bernard
## 1413         h         C   Male     Boomer      Gene
## 1414         h         A   Male     Boomer   Herbert
## 1415         h         B   Male     Boomer       Ray
## 1416         h         C   Male     Boomer       Tom
## 1417         h         A   Male     Boomer       Lee
## 1418         h         B   Male     Boomer    Alfred
## 1419         h         C   Male     Boomer     Leroy
## 1420         h         A   Male     Boomer     Eddie
## 1421         h         B   Male       GenX      Marc
## 1422         h         C   Male       GenX     Jamie
## 1423         h         A   Male       GenX      Greg
## 1424         h         B   Male       GenX    Darryl
## 1425         h         C   Male       GenX       Tim
## 1426         h         A   Male       GenX      Dean
## 1427         h         B   Male       GenX       Jon
## 1428         h         C   Male       GenX     Chris
## 1429         h         A   Male       GenX      Troy
## 1430         h         B   Male       GenX      Jeff
## 1431         h         C   Male  Millenial   Zachary
## 1432         h         A   Male  Millenial     Dylan
## 1433         h         B   Male  Millenial Christian
## 1434         h         C   Male  Millenial    Wesley
## 1435         h         A   Male  Millenial      Seth
## 1436         h         B   Male  Millenial    Austin
## 1437         h         C   Male  Millenial   Gabriel
## 1438         h         A   Male  Millenial      Evan
## 1439         h         B   Male  Millenial     Casey
## 1440         h         C   Male  Millenial      Luis
## 1441         i         A Female     Boomer    Gloria
## 1442         i         B Female     Boomer      Joan
## 1443         i         C Female     Boomer   Dorothy
## 1444         i         A Female     Boomer   Shirley
## 1445         i         B Female     Boomer     Betty
## 1446         i         C Female     Boomer    Dianne
## 1447         i         A Female     Boomer       Kay
## 1448         i         B Female     Boomer  Marjorie
## 1449         i         C Female     Boomer  Lorraine
## 1450         i         A Female     Boomer   Mildred
## 1451         i         B Female       GenX     Tracy
## 1452         i         C Female       GenX      Dawn
## 1453         i         A Female       GenX      Tina
## 1454         i         B Female       GenX     Tammy
## 1455         i         C Female       GenX   Melinda
## 1456         i         A Female       GenX    Tamara
## 1457         i         B Female       GenX    Tracey
## 1458         i         C Female       GenX   Colleen
## 1459         i         A Female       GenX    Sherri
## 1460         i         B Female       GenX     Heidi
## 1461         i         C Female  Millenial  Samantha
```

```
## 1462         i         A Female  Millenial    Alexis
## 1463         i         B Female  Millenial  Brittany
## 1464         i         C Female  Millenial    Lauren
## 1465         i         A Female  Millenial    Taylor
## 1466         i         B Female  Millenial   Bethany
## 1467         i         C Female  Millenial    Latoya
## 1468         i         A Female  Millenial   Candice
## 1469         i         B Female  Millenial  Brittney
## 1470         i         C Female  Millenial  Cheyenne
## 1471         i         A   Male     Boomer  Theodore
## 1472         i         B   Male     Boomer   Bernard
## 1473         i         C   Male     Boomer      Gene
## 1474         i         A   Male     Boomer   Herbert
## 1475         i         B   Male     Boomer       Ray
## 1476         i         C   Male     Boomer       Tom
## 1477         i         A   Male     Boomer       Lee
## 1478         i         B   Male     Boomer    Alfred
## 1479         i         C   Male     Boomer     Leroy
## 1480         i         A   Male     Boomer     Eddie
## 1481         i         B   Male       GenX      Marc
## 1482         i         C   Male       GenX     Jamie
## 1483         i         A   Male       GenX      Greg
## 1484         i         B   Male       GenX    Darryl
## 1485         i         C   Male       GenX       Tim
## 1486         i         A   Male       GenX      Dean
## 1487         i         B   Male       GenX       Jon
## 1488         i         C   Male       GenX     Chris
## 1489         i         A   Male       GenX      Troy
## 1490         i         B   Male       GenX      Jeff
## 1491         i         C   Male  Millenial   Zachary
## 1492         i         A   Male  Millenial     Dylan
## 1493         i         B   Male  Millenial Christian
## 1494         i         C   Male  Millenial    Wesley
## 1495         i         A   Male  Millenial      Seth
## 1496         i         B   Male  Millenial    Austin
## 1497         i         C   Male  Millenial   Gabriel
## 1498         i         A   Male  Millenial      Evan
## 1499         i         B   Male  Millenial     Casey
## 1500         i         C   Male  Millenial      Luis
## 1501         i         A Female     Boomer    Gloria
## 1502         i         B Female     Boomer      Joan
## 1503         i         C Female     Boomer   Dorothy
## 1504         i         A Female     Boomer   Shirley
## 1505         i         B Female     Boomer     Betty
## 1506         i         C Female     Boomer    Dianne
## 1507         i         A Female     Boomer       Kay
## 1508         i         B Female     Boomer  Marjorie
## 1509         i         C Female     Boomer  Lorraine
## 1510         i         A Female     Boomer   Mildred
## 1511         i         B Female       GenX     Tracy
```

```
## 1512         i         C Female       GenX      Dawn
## 1513         i         A Female       GenX      Tina
## 1514         i         B Female       GenX     Tammy
## 1515         i         C Female       GenX   Melinda
## 1516         i         A Female       GenX    Tamara
## 1517         i         B Female       GenX    Tracey
## 1518         i         C Female       GenX   Colleen
## 1519         i         A Female       GenX    Sherri
## 1520         i         B Female       GenX     Heidi
## 1521         i         C Female  Millenial  Samantha
## 1522         i         A Female  Millenial    Alexis
## 1523         i         B Female  Millenial  Brittany
## 1524         i         C Female  Millenial    Lauren
## 1525         i         A Female  Millenial    Taylor
## 1526         i         B Female  Millenial   Bethany
## 1527         i         C Female  Millenial    Latoya
## 1528         i         A Female  Millenial   Candice
## 1529         i         B Female  Millenial  Brittney
## 1530         i         C Female  Millenial  Cheyenne
## 1531         i         A   Male     Boomer  Theodore
## 1532         i         B   Male     Boomer   Bernard
## 1533         i         C   Male     Boomer      Gene
## 1534         i         A   Male     Boomer   Herbert
## 1535         i         B   Male     Boomer       Ray
## 1536         i         C   Male     Boomer       Tom
## 1537         i         A   Male     Boomer       Lee
## 1538         i         B   Male     Boomer    Alfred
## 1539         i         C   Male     Boomer     Leroy
## 1540         i         A   Male     Boomer     Eddie
## 1541         i         B   Male       GenX      Marc
## 1542         i         C   Male       GenX     Jamie
## 1543         i         A   Male       GenX      Greg
## 1544         i         B   Male       GenX    Darryl
## 1545         i         C   Male       GenX       Tim
## 1546         i         A   Male       GenX      Dean
## 1547         i         B   Male       GenX       Jon
## 1548         i         C   Male       GenX     Chris
## 1549         i         A   Male       GenX      Troy
## 1550         i         B   Male       GenX      Jeff
## 1551         i         C   Male  Millenial   Zachary
## 1552         i         A   Male  Millenial     Dylan
## 1553         i         B   Male  Millenial Christian
## 1554         i         C   Male  Millenial    Wesley
## 1555         i         A   Male  Millenial      Seth
## 1556         i         B   Male  Millenial    Austin
## 1557         i         C   Male  Millenial   Gabriel
## 1558         i         A   Male  Millenial      Evan
## 1559         i         B   Male  Millenial     Casey
## 1560         i         C   Male  Millenial      Luis
## 1561         i         A Female     Boomer    Gloria
```

```
## 1562         i         B Female     Boomer      Joan
## 1563         i         C Female     Boomer   Dorothy
## 1564         i         A Female     Boomer   Shirley
## 1565         i         B Female     Boomer     Betty
## 1566         i         C Female     Boomer    Dianne
## 1567         i         A Female     Boomer       Kay
## 1568         i         B Female     Boomer  Marjorie
## 1569         i         C Female     Boomer  Lorraine
## 1570         i         A Female     Boomer   Mildred
## 1571         i         B Female       GenX     Tracy
## 1572         i         C Female       GenX      Dawn
## 1573         i         A Female       GenX      Tina
## 1574         i         B Female       GenX     Tammy
## 1575         i         C Female       GenX   Melinda
## 1576         i         A Female       GenX    Tamara
## 1577         i         B Female       GenX    Tracey
## 1578         i         C Female       GenX   Colleen
## 1579         i         A Female       GenX    Sherri
## 1580         i         B Female       GenX     Heidi
## 1581         i         C Female  Millenial  Samantha
## 1582         i         A Female  Millenial    Alexis
## 1583         i         B Female  Millenial  Brittany
## 1584         i         C Female  Millenial    Lauren
## 1585         i         A Female  Millenial    Taylor
## 1586         i         B Female  Millenial   Bethany
## 1587         i         C Female  Millenial    Latoya
## 1588         i         A Female  Millenial   Candice
## 1589         i         B Female  Millenial  Brittney
## 1590         i         C Female  Millenial  Cheyenne
## 1591         i         A   Male     Boomer  Theodore
## 1592         i         B   Male     Boomer   Bernard
## 1593         i         C   Male     Boomer      Gene
## 1594         i         A   Male     Boomer   Herbert
## 1595         i         B   Male     Boomer       Ray
## 1596         i         C   Male     Boomer       Tom
## 1597         i         A   Male     Boomer       Lee
## 1598         i         B   Male     Boomer    Alfred
## 1599         i         C   Male     Boomer     Leroy
## 1600         i         A   Male     Boomer     Eddie
## 1601         i         B   Male       GenX      Marc
## 1602         i         C   Male       GenX     Jamie
## 1603         i         A   Male       GenX      Greg
## 1604         i         B   Male       GenX    Darryl
## 1605         i         C   Male       GenX       Tim
## 1606         i         A   Male       GenX      Dean
## 1607         i         B   Male       GenX       Jon
## 1608         i         C   Male       GenX     Chris
## 1609         i         A   Male       GenX      Troy
## 1610         i         B   Male       GenX      Jeff
## 1611         i         C   Male  Millenial   Zachary
```

```
## 1612         i         A   Male  Millenial     Dylan
## 1613         i         B   Male  Millenial Christian
## 1614         i         C   Male  Millenial    Wesley
## 1615         i         A   Male  Millenial      Seth
## 1616         i         B   Male  Millenial    Austin
## 1617         i         C   Male  Millenial   Gabriel
## 1618         i         A   Male  Millenial      Evan
## 1619         i         B   Male  Millenial     Casey
## 1620         i         C   Male  Millenial      Luis
## 1621         j         A Female     Boomer    Gloria
## 1622         j         B Female     Boomer      Joan
## 1623         j         C Female     Boomer   Dorothy
## 1624         j         A Female     Boomer   Shirley
## 1625         j         B Female     Boomer     Betty
## 1626         j         C Female     Boomer    Dianne
## 1627         j         A Female     Boomer       Kay
## 1628         j         B Female     Boomer  Marjorie
## 1629         j         C Female     Boomer  Lorraine
## 1630         j         A Female     Boomer   Mildred
## 1631         j         B Female       GenX     Tracy
## 1632         j         C Female       GenX      Dawn
## 1633         j         A Female       GenX      Tina
## 1634         j         B Female       GenX     Tammy
## 1635         j         C Female       GenX   Melinda
## 1636         j         A Female       GenX    Tamara
## 1637         j         B Female       GenX    Tracey
## 1638         j         C Female       GenX   Colleen
## 1639         j         A Female       GenX    Sherri
## 1640         j         B Female       GenX     Heidi
## 1641         j         C Female  Millenial  Samantha
## 1642         j         A Female  Millenial    Alexis
## 1643         j         B Female  Millenial  Brittany
## 1644         j         C Female  Millenial    Lauren
## 1645         j         A Female  Millenial    Taylor
## 1646         j         B Female  Millenial   Bethany
## 1647         j         C Female  Millenial    Latoya
## 1648         j         A Female  Millenial   Candice
## 1649         j         B Female  Millenial  Brittney
## 1650         j         C Female  Millenial  Cheyenne
## 1651         j         A   Male     Boomer  Theodore
## 1652         j         B   Male     Boomer   Bernard
## 1653         j         C   Male     Boomer      Gene
## 1654         j         A   Male     Boomer   Herbert
## 1655         j         B   Male     Boomer       Ray
## 1656         j         C   Male     Boomer       Tom
## 1657         j         A   Male     Boomer       Lee
## 1658         j         B   Male     Boomer    Alfred
## 1659         j         C   Male     Boomer     Leroy
## 1660         j         A   Male     Boomer     Eddie
## 1661         j         B   Male       GenX      Marc
```

```
## 1662         j         C   Male       GenX     Jamie
## 1663         j         A   Male       GenX      Greg
## 1664         j         B   Male       GenX    Darryl
## 1665         j         C   Male       GenX       Tim
## 1666         j         A   Male       GenX      Dean
## 1667         j         B   Male       GenX       Jon
## 1668         j         C   Male       GenX     Chris
## 1669         j         A   Male       GenX      Troy
## 1670         j         B   Male       GenX      Jeff
## 1671         j         C   Male  Millenial   Zachary
## 1672         j         A   Male  Millenial     Dylan
## 1673         j         B   Male  Millenial Christian
## 1674         j         C   Male  Millenial    Wesley
## 1675         j         A   Male  Millenial      Seth
## 1676         j         B   Male  Millenial    Austin
## 1677         j         C   Male  Millenial   Gabriel
## 1678         j         A   Male  Millenial      Evan
## 1679         j         B   Male  Millenial     Casey
## 1680         j         C   Male  Millenial      Luis
## 1681         j         A Female     Boomer    Gloria
## 1682         j         B Female     Boomer      Joan
## 1683         j         C Female     Boomer   Dorothy
## 1684         j         A Female     Boomer   Shirley
## 1685         j         B Female     Boomer     Betty
## 1686         j         C Female     Boomer    Dianne
## 1687         j         A Female     Boomer       Kay
## 1688         j         B Female     Boomer  Marjorie
## 1689         j         C Female     Boomer  Lorraine
## 1690         j         A Female     Boomer   Mildred
## 1691         j         B Female       GenX     Tracy
## 1692         j         C Female       GenX      Dawn
## 1693         j         A Female       GenX      Tina
## 1694         j         B Female       GenX     Tammy
## 1695         j         C Female       GenX   Melinda
## 1696         j         A Female       GenX    Tamara
## 1697         j         B Female       GenX    Tracey
## 1698         j         C Female       GenX   Colleen
## 1699         j         A Female       GenX    Sherri
## 1700         j         B Female       GenX     Heidi
## 1701         j         C Female  Millenial  Samantha
## 1702         j         A Female  Millenial    Alexis
## 1703         j         B Female  Millenial  Brittany
## 1704         j         C Female  Millenial    Lauren
## 1705         j         A Female  Millenial    Taylor
## 1706         j         B Female  Millenial   Bethany
## 1707         j         C Female  Millenial    Latoya
## 1708         j         A Female  Millenial   Candice
## 1709         j         B Female  Millenial  Brittney
## 1710         j         C Female  Millenial  Cheyenne
## 1711         j         A   Male     Boomer  Theodore
```

```
## 1712         j         B   Male     Boomer   Bernard
## 1713         j         C   Male     Boomer      Gene
## 1714         j         A   Male     Boomer   Herbert
## 1715         j         B   Male     Boomer       Ray
## 1716         j         C   Male     Boomer       Tom
## 1717         j         A   Male     Boomer       Lee
## 1718         j         B   Male     Boomer    Alfred
## 1719         j         C   Male     Boomer     Leroy
## 1720         j         A   Male     Boomer     Eddie
## 1721         j         B   Male       GenX      Marc
## 1722         j         C   Male       GenX     Jamie
## 1723         j         A   Male       GenX      Greg
## 1724         j         B   Male       GenX    Darryl
## 1725         j         C   Male       GenX       Tim
## 1726         j         A   Male       GenX      Dean
## 1727         j         B   Male       GenX       Jon
## 1728         j         C   Male       GenX     Chris
## 1729         j         A   Male       GenX      Troy
## 1730         j         B   Male       GenX      Jeff
## 1731         j         C   Male  Millenial   Zachary
## 1732         j         A   Male  Millenial     Dylan
## 1733         j         B   Male  Millenial Christian
## 1734         j         C   Male  Millenial    Wesley
## 1735         j         A   Male  Millenial      Seth
## 1736         j         B   Male  Millenial    Austin
## 1737         j         C   Male  Millenial   Gabriel
## 1738         j         A   Male  Millenial      Evan
## 1739         j         B   Male  Millenial     Casey
## 1740         j         C   Male  Millenial      Luis
## 1741         j         A Female     Boomer    Gloria
## 1742         j         B Female     Boomer      Joan
## 1743         j         C Female     Boomer   Dorothy
## 1744         j         A Female     Boomer   Shirley
## 1745         j         B Female     Boomer     Betty
## 1746         j         C Female     Boomer    Dianne
## 1747         j         A Female     Boomer       Kay
## 1748         j         B Female     Boomer  Marjorie
## 1749         j         C Female     Boomer  Lorraine
## 1750         j         A Female     Boomer   Mildred
## 1751         j         B Female       GenX     Tracy
## 1752         j         C Female       GenX      Dawn
## 1753         j         A Female       GenX      Tina
## 1754         j         B Female       GenX     Tammy
## 1755         j         C Female       GenX   Melinda
## 1756         j         A Female       GenX    Tamara
## 1757         j         B Female       GenX    Tracey
## 1758         j         C Female       GenX   Colleen
## 1759         j         A Female       GenX    Sherri
## 1760         j         B Female       GenX     Heidi
## 1761         j         C Female  Millenial  Samantha
```

```
## 1762         j         A Female  Millenial    Alexis
## 1763         j         B Female  Millenial  Brittany
## 1764         j         C Female  Millenial    Lauren
## 1765         j         A Female  Millenial    Taylor
## 1766         j         B Female  Millenial   Bethany
## 1767         j         C Female  Millenial    Latoya
## 1768         j         A Female  Millenial   Candice
## 1769         j         B Female  Millenial  Brittney
## 1770         j         C Female  Millenial  Cheyenne
## 1771         j         A   Male     Boomer  Theodore
## 1772         j         B   Male     Boomer   Bernard
## 1773         j         C   Male     Boomer      Gene
## 1774         j         A   Male     Boomer   Herbert
## 1775         j         B   Male     Boomer       Ray
## 1776         j         C   Male     Boomer       Tom
## 1777         j         A   Male     Boomer       Lee
## 1778         j         B   Male     Boomer    Alfred
## 1779         j         C   Male     Boomer     Leroy
## 1780         j         A   Male     Boomer     Eddie
## 1781         j         B   Male       GenX      Marc
## 1782         j         C   Male       GenX     Jamie
## 1783         j         A   Male       GenX      Greg
## 1784         j         B   Male       GenX    Darryl
## 1785         j         C   Male       GenX       Tim
## 1786         j         A   Male       GenX      Dean
## 1787         j         B   Male       GenX       Jon
## 1788         j         C   Male       GenX     Chris
## 1789         j         A   Male       GenX      Troy
## 1790         j         B   Male       GenX      Jeff
## 1791         j         C   Male  Millenial   Zachary
## 1792         j         A   Male  Millenial     Dylan
## 1793         j         B   Male  Millenial Christian
## 1794         j         C   Male  Millenial    Wesley
## 1795         j         A   Male  Millenial      Seth
## 1796         j         B   Male  Millenial    Austin
## 1797         j         C   Male  Millenial   Gabriel
## 1798         j         A   Male  Millenial      Evan
## 1799         j         B   Male  Millenial     Casey
## 1800         j         C   Male  Millenial      Luis
## 1801         k         A Female     Boomer    Gloria
## 1802         k         B Female     Boomer      Joan
## 1803         k         C Female     Boomer   Dorothy
## 1804         k         A Female     Boomer   Shirley
## 1805         k         B Female     Boomer     Betty
## 1806         k         C Female     Boomer    Dianne
## 1807         k         A Female     Boomer       Kay
## 1808         k         B Female     Boomer  Marjorie
## 1809         k         C Female     Boomer  Lorraine
## 1810         k         A Female     Boomer   Mildred
## 1811         k         B Female       GenX     Tracy
```

```
## 1812         k         C Female       GenX      Dawn
## 1813         k         A Female       GenX      Tina
## 1814         k         B Female       GenX     Tammy
## 1815         k         C Female       GenX   Melinda
## 1816         k         A Female       GenX    Tamara
## 1817         k         B Female       GenX    Tracey
## 1818         k         C Female       GenX   Colleen
## 1819         k         A Female       GenX    Sherri
## 1820         k         B Female       GenX     Heidi
## 1821         k         C Female  Millenial  Samantha
## 1822         k         A Female  Millenial    Alexis
## 1823         k         B Female  Millenial  Brittany
## 1824         k         C Female  Millenial    Lauren
## 1825         k         A Female  Millenial    Taylor
## 1826         k         B Female  Millenial   Bethany
## 1827         k         C Female  Millenial    Latoya
## 1828         k         A Female  Millenial   Candice
## 1829         k         B Female  Millenial  Brittney
## 1830         k         C Female  Millenial  Cheyenne
## 1831         k         A   Male     Boomer  Theodore
## 1832         k         B   Male     Boomer   Bernard
## 1833         k         C   Male     Boomer      Gene
## 1834         k         A   Male     Boomer   Herbert
## 1835         k         B   Male     Boomer       Ray
## 1836         k         C   Male     Boomer       Tom
## 1837         k         A   Male     Boomer       Lee
## 1838         k         B   Male     Boomer    Alfred
## 1839         k         C   Male     Boomer     Leroy
## 1840         k         A   Male     Boomer     Eddie
## 1841         k         B   Male       GenX      Marc
## 1842         k         C   Male       GenX     Jamie
## 1843         k         A   Male       GenX      Greg
## 1844         k         B   Male       GenX    Darryl
## 1845         k         C   Male       GenX       Tim
## 1846         k         A   Male       GenX      Dean
## 1847         k         B   Male       GenX       Jon
## 1848         k         C   Male       GenX     Chris
## 1849         k         A   Male       GenX      Troy
## 1850         k         B   Male       GenX      Jeff
## 1851         k         C   Male  Millenial   Zachary
## 1852         k         A   Male  Millenial     Dylan
## 1853         k         B   Male  Millenial Christian
## 1854         k         C   Male  Millenial    Wesley
## 1855         k         A   Male  Millenial      Seth
## 1856         k         B   Male  Millenial    Austin
## 1857         k         C   Male  Millenial   Gabriel
## 1858         k         A   Male  Millenial      Evan
## 1859         k         B   Male  Millenial     Casey
## 1860         k         C   Male  Millenial      Luis
## 1861         k         A Female     Boomer    Gloria
```

```
## 1862         k         B Female     Boomer      Joan
## 1863         k         C Female     Boomer   Dorothy
## 1864         k         A Female     Boomer   Shirley
## 1865         k         B Female     Boomer     Betty
## 1866         k         C Female     Boomer    Dianne
## 1867         k         A Female     Boomer       Kay
## 1868         k         B Female     Boomer  Marjorie
## 1869         k         C Female     Boomer  Lorraine
## 1870         k         A Female     Boomer   Mildred
## 1871         k         B Female       GenX     Tracy
## 1872         k         C Female       GenX      Dawn
## 1873         k         A Female       GenX      Tina
## 1874         k         B Female       GenX     Tammy
## 1875         k         C Female       GenX   Melinda
## 1876         k         A Female       GenX    Tamara
## 1877         k         B Female       GenX    Tracey
## 1878         k         C Female       GenX   Colleen
## 1879         k         A Female       GenX    Sherri
## 1880         k         B Female       GenX     Heidi
## 1881         k         C Female  Millenial  Samantha
## 1882         k         A Female  Millenial    Alexis
## 1883         k         B Female  Millenial  Brittany
## 1884         k         C Female  Millenial    Lauren
## 1885         k         A Female  Millenial    Taylor
## 1886         k         B Female  Millenial   Bethany
## 1887         k         C Female  Millenial    Latoya
## 1888         k         A Female  Millenial   Candice
## 1889         k         B Female  Millenial  Brittney
## 1890         k         C Female  Millenial  Cheyenne
## 1891         k         A   Male     Boomer  Theodore
## 1892         k         B   Male     Boomer   Bernard
## 1893         k         C   Male     Boomer      Gene
## 1894         k         A   Male     Boomer   Herbert
## 1895         k         B   Male     Boomer       Ray
## 1896         k         C   Male     Boomer       Tom
## 1897         k         A   Male     Boomer       Lee
## 1898         k         B   Male     Boomer    Alfred
## 1899         k         C   Male     Boomer     Leroy
## 1900         k         A   Male     Boomer     Eddie
## 1901         k         B   Male       GenX      Marc
## 1902         k         C   Male       GenX     Jamie
## 1903         k         A   Male       GenX      Greg
## 1904         k         B   Male       GenX    Darryl
## 1905         k         C   Male       GenX       Tim
## 1906         k         A   Male       GenX      Dean
## 1907         k         B   Male       GenX       Jon
## 1908         k         C   Male       GenX     Chris
## 1909         k         A   Male       GenX      Troy
## 1910         k         B   Male       GenX      Jeff
## 1911         k         C   Male  Millenial   Zachary
```

```
## 1912         k         A   Male  Millenial     Dylan
## 1913         k         B   Male  Millenial Christian
## 1914         k         C   Male  Millenial    Wesley
## 1915         k         A   Male  Millenial      Seth
## 1916         k         B   Male  Millenial    Austin
## 1917         k         C   Male  Millenial   Gabriel
## 1918         k         A   Male  Millenial      Evan
## 1919         k         B   Male  Millenial     Casey
## 1920         k         C   Male  Millenial      Luis
## 1921         k         A Female     Boomer    Gloria
## 1922         k         B Female     Boomer      Joan
## 1923         k         C Female     Boomer   Dorothy
## 1924         k         A Female     Boomer   Shirley
## 1925         k         B Female     Boomer     Betty
## 1926         k         C Female     Boomer    Dianne
## 1927         k         A Female     Boomer       Kay
## 1928         k         B Female     Boomer  Marjorie
## 1929         k         C Female     Boomer  Lorraine
## 1930         k         A Female     Boomer   Mildred
## 1931         k         B Female       GenX     Tracy
## 1932         k         C Female       GenX      Dawn
## 1933         k         A Female       GenX      Tina
## 1934         k         B Female       GenX     Tammy
## 1935         k         C Female       GenX   Melinda
## 1936         k         A Female       GenX    Tamara
## 1937         k         B Female       GenX    Tracey
## 1938         k         C Female       GenX   Colleen
## 1939         k         A Female       GenX    Sherri
## 1940         k         B Female       GenX     Heidi
## 1941         k         C Female  Millenial  Samantha
## 1942         k         A Female  Millenial    Alexis
## 1943         k         B Female  Millenial  Brittany
## 1944         k         C Female  Millenial    Lauren
## 1945         k         A Female  Millenial    Taylor
## 1946         k         B Female  Millenial   Bethany
## 1947         k         C Female  Millenial    Latoya
## 1948         k         A Female  Millenial   Candice
## 1949         k         B Female  Millenial  Brittney
## 1950         k         C Female  Millenial  Cheyenne
## 1951         k         A   Male     Boomer  Theodore
## 1952         k         B   Male     Boomer   Bernard
## 1953         k         C   Male     Boomer      Gene
## 1954         k         A   Male     Boomer   Herbert
## 1955         k         B   Male     Boomer       Ray
## 1956         k         C   Male     Boomer       Tom
## 1957         k         A   Male     Boomer       Lee
## 1958         k         B   Male     Boomer    Alfred
## 1959         k         C   Male     Boomer     Leroy
## 1960         k         A   Male     Boomer     Eddie
## 1961         k         B   Male       GenX      Marc
```

```
## 1962         k         C   Male       GenX     Jamie
## 1963         k         A   Male       GenX      Greg
## 1964         k         B   Male       GenX    Darryl
## 1965         k         C   Male       GenX       Tim
## 1966         k         A   Male       GenX      Dean
## 1967         k         B   Male       GenX       Jon
## 1968         k         C   Male       GenX     Chris
## 1969         k         A   Male       GenX      Troy
## 1970         k         B   Male       GenX      Jeff
## 1971         k         C   Male  Millenial   Zachary
## 1972         k         A   Male  Millenial     Dylan
## 1973         k         B   Male  Millenial Christian
## 1974         k         C   Male  Millenial    Wesley
## 1975         k         A   Male  Millenial      Seth
## 1976         k         B   Male  Millenial    Austin
## 1977         k         C   Male  Millenial   Gabriel
## 1978         k         A   Male  Millenial      Evan
## 1979         k         B   Male  Millenial     Casey
## 1980         k         C   Male  Millenial      Luis
## 1981         l         A Female     Boomer    Gloria
## 1982         l         B Female     Boomer      Joan
## 1983         l         C Female     Boomer   Dorothy
## 1984         l         A Female     Boomer   Shirley
## 1985         l         B Female     Boomer     Betty
## 1986         l         C Female     Boomer    Dianne
## 1987         l         A Female     Boomer       Kay
## 1988         l         B Female     Boomer  Marjorie
## 1989         l         C Female     Boomer  Lorraine
## 1990         l         A Female     Boomer   Mildred
## 1991         l         B Female       GenX     Tracy
## 1992         l         C Female       GenX      Dawn
## 1993         l         A Female       GenX      Tina
## 1994         l         B Female       GenX     Tammy
## 1995         l         C Female       GenX   Melinda
## 1996         l         A Female       GenX    Tamara
## 1997         l         B Female       GenX    Tracey
## 1998         l         C Female       GenX   Colleen
## 1999         l         A Female       GenX    Sherri
## 2000         l         B Female       GenX     Heidi
## 2001         l         C Female  Millenial  Samantha
## 2002         l         A Female  Millenial    Alexis
## 2003         l         B Female  Millenial  Brittany
## 2004         l         C Female  Millenial    Lauren
## 2005         l         A Female  Millenial    Taylor
## 2006         l         B Female  Millenial   Bethany
## 2007         l         C Female  Millenial    Latoya
## 2008         l         A Female  Millenial   Candice
## 2009         l         B Female  Millenial  Brittney
## 2010         l         C Female  Millenial  Cheyenne
## 2011         l         A   Male     Boomer  Theodore
```

```
## 2012         1         B   Male     Boomer   Bernard
## 2013         1         C   Male     Boomer      Gene
## 2014         1         A   Male     Boomer   Herbert
## 2015         1         B   Male     Boomer       Ray
## 2016         1         C   Male     Boomer       Tom
## 2017         1         A   Male     Boomer       Lee
## 2018         1         B   Male     Boomer    Alfred
## 2019         1         C   Male     Boomer     Leroy
## 2020         1         A   Male     Boomer     Eddie
## 2021         1         B   Male       GenX      Marc
## 2022         1         C   Male       GenX     Jamie
## 2023         1         A   Male       GenX      Greg
## 2024         1         B   Male       GenX    Darryl
## 2025         1         C   Male       GenX       Tim
## 2026         1         A   Male       GenX      Dean
## 2027         1         B   Male       GenX       Jon
## 2028         1         C   Male       GenX     Chris
## 2029         1         A   Male       GenX      Troy
## 2030         1         B   Male       GenX      Jeff
## 2031         1         C   Male  Millenial   Zachary
## 2032         1         A   Male  Millenial     Dylan
## 2033         1         B   Male  Millenial Christian
## 2034         1         C   Male  Millenial    Wesley
## 2035         1         A   Male  Millenial      Seth
## 2036         1         B   Male  Millenial    Austin
## 2037         1         C   Male  Millenial   Gabriel
## 2038         1         A   Male  Millenial      Evan
## 2039         1         B   Male  Millenial     Casey
## 2040         1         C   Male  Millenial      Luis
## 2041         1         A Female     Boomer    Gloria
## 2042         1         B Female     Boomer      Joan
## 2043         1         C Female     Boomer   Dorothy
## 2044         1         A Female     Boomer   Shirley
## 2045         1         B Female     Boomer     Betty
## 2046         1         C Female     Boomer    Dianne
## 2047         1         A Female     Boomer       Kay
## 2048         1         B Female     Boomer  Marjorie
## 2049         1         C Female     Boomer  Lorraine
## 2050         1         A Female     Boomer   Mildred
## 2051         1         B Female       GenX     Tracy
## 2052         1         C Female       GenX      Dawn
## 2053         1         A Female       GenX      Tina
## 2054         1         B Female       GenX     Tammy
## 2055         1         C Female       GenX   Melinda
## 2056         1         A Female       GenX    Tamara
## 2057         1         B Female       GenX    Tracey
## 2058         1         C Female       GenX   Colleen
## 2059         1         A Female       GenX    Sherri
## 2060         1         B Female       GenX     Heidi
## 2061         1         C Female  Millenial  Samantha
```

```
## 2062         1         A Female  Millenial    Alexis
## 2063         1         B Female  Millenial  Brittany
## 2064         1         C Female  Millenial    Lauren
## 2065         1         A Female  Millenial    Taylor
## 2066         1         B Female  Millenial   Bethany
## 2067         1         C Female  Millenial    Latoya
## 2068         1         A Female  Millenial   Candice
## 2069         1         B Female  Millenial  Brittney
## 2070         1         C Female  Millenial  Cheyenne
## 2071         1         A   Male     Boomer  Theodore
## 2072         1         B   Male     Boomer   Bernard
## 2073         1         C   Male     Boomer      Gene
## 2074         1         A   Male     Boomer   Herbert
## 2075         1         B   Male     Boomer       Ray
## 2076         1         C   Male     Boomer       Tom
## 2077         1         A   Male     Boomer       Lee
## 2078         1         B   Male     Boomer    Alfred
## 2079         1         C   Male     Boomer     Leroy
## 2080         1         A   Male     Boomer     Eddie
## 2081         1         B   Male       GenX      Marc
## 2082         1         C   Male       GenX     Jamie
## 2083         1         A   Male       GenX      Greg
## 2084         1         B   Male       GenX    Darryl
## 2085         1         C   Male       GenX       Tim
## 2086         1         A   Male       GenX      Dean
## 2087         1         B   Male       GenX       Jon
## 2088         1         C   Male       GenX     Chris
## 2089         1         A   Male       GenX      Troy
## 2090         1         B   Male       GenX      Jeff
## 2091         1         C   Male  Millenial   Zachary
## 2092         1         A   Male  Millenial     Dylan
## 2093         1         B   Male  Millenial Christian
## 2094         1         C   Male  Millenial    Wesley
## 2095         1         A   Male  Millenial      Seth
## 2096         1         B   Male  Millenial    Austin
## 2097         1         C   Male  Millenial   Gabriel
## 2098         1         A   Male  Millenial      Evan
## 2099         1         B   Male  Millenial     Casey
## 2100         1         C   Male  Millenial      Luis
## 2101         1         A Female     Boomer    Gloria
## 2102         1         B Female     Boomer      Joan
## 2103         1         C Female     Boomer   Dorothy
## 2104         1         A Female     Boomer   Shirley
## 2105         1         B Female     Boomer     Betty
## 2106         1         C Female     Boomer    Dianne
## 2107         1         A Female     Boomer       Kay
## 2108         1         B Female     Boomer  Marjorie
## 2109         1         C Female     Boomer  Lorraine
## 2110         1         A Female     Boomer   Mildred
## 2111         1         B Female       GenX     Tracy
```

```
## 2112         l         C Female       GenX      Dawn
## 2113         l         A Female       GenX      Tina
## 2114         l         B Female       GenX     Tammy
## 2115         l         C Female       GenX   Melinda
## 2116         l         A Female       GenX    Tamara
## 2117         l         B Female       GenX    Tracey
## 2118         l         C Female       GenX   Colleen
## 2119         l         A Female       GenX    Sherri
## 2120         l         B Female       GenX     Heidi
## 2121         l         C Female  Millenial  Samantha
## 2122         l         A Female  Millenial    Alexis
## 2123         l         B Female  Millenial  Brittany
## 2124         l         C Female  Millenial    Lauren
## 2125         l         A Female  Millenial    Taylor
## 2126         l         B Female  Millenial   Bethany
## 2127         l         C Female  Millenial    Latoya
## 2128         l         A Female  Millenial   Candice
## 2129         l         B Female  Millenial  Brittney
## 2130         l         C Female  Millenial  Cheyenne
## 2131         l         A   Male     Boomer  Theodore
## 2132         l         B   Male     Boomer   Bernard
## 2133         l         C   Male     Boomer      Gene
## 2134         l         A   Male     Boomer   Herbert
## 2135         l         B   Male     Boomer       Ray
## 2136         l         C   Male     Boomer       Tom
## 2137         l         A   Male     Boomer       Lee
## 2138         l         B   Male     Boomer    Alfred
## 2139         l         C   Male     Boomer     Leroy
## 2140         l         A   Male     Boomer     Eddie
## 2141         l         B   Male       GenX      Marc
## 2142         l         C   Male       GenX     Jamie
## 2143         l         A   Male       GenX      Greg
## 2144         l         B   Male       GenX    Darryl
## 2145         l         C   Male       GenX       Tim
## 2146         l         A   Male       GenX      Dean
## 2147         l         B   Male       GenX       Jon
## 2148         l         C   Male       GenX     Chris
## 2149         l         A   Male       GenX      Troy
## 2150         l         B   Male       GenX      Jeff
## 2151         l         C   Male  Millenial   Zachary
## 2152         l         A   Male  Millenial     Dylan
## 2153         l         B   Male  Millenial Christian
## 2154         l         C   Male  Millenial    Wesley
## 2155         l         A   Male  Millenial      Seth
## 2156         l         B   Male  Millenial    Austin
## 2157         l         C   Male  Millenial   Gabriel
## 2158         l         A   Male  Millenial      Evan
## 2159         l         B   Male  Millenial     Casey
## 2160         l         C   Male  Millenial      Luis
## 2161         m         A Female     Boomer    Gloria
```

```
## 2162         m         B Female     Boomer      Joan
## 2163         m         C Female     Boomer   Dorothy
## 2164         m         A Female     Boomer   Shirley
## 2165         m         B Female     Boomer     Betty
## 2166         m         C Female     Boomer    Dianne
## 2167         m         A Female     Boomer       Kay
## 2168         m         B Female     Boomer  Marjorie
## 2169         m         C Female     Boomer  Lorraine
## 2170         m         A Female     Boomer   Mildred
## 2171         m         B Female       GenX     Tracy
## 2172         m         C Female       GenX      Dawn
## 2173         m         A Female       GenX      Tina
## 2174         m         B Female       GenX     Tammy
## 2175         m         C Female       GenX   Melinda
## 2176         m         A Female       GenX    Tamara
## 2177         m         B Female       GenX    Tracey
## 2178         m         C Female       GenX   Colleen
## 2179         m         A Female       GenX    Sherri
## 2180         m         B Female       GenX     Heidi
## 2181         m         C Female  Millenial  Samantha
## 2182         m         A Female  Millenial    Alexis
## 2183         m         B Female  Millenial  Brittany
## 2184         m         C Female  Millenial    Lauren
## 2185         m         A Female  Millenial    Taylor
## 2186         m         B Female  Millenial   Bethany
## 2187         m         C Female  Millenial    Latoya
## 2188         m         A Female  Millenial   Candice
## 2189         m         B Female  Millenial  Brittney
## 2190         m         C Female  Millenial  Cheyenne
## 2191         m         A   Male     Boomer  Theodore
## 2192         m         B   Male     Boomer   Bernard
## 2193         m         C   Male     Boomer      Gene
## 2194         m         A   Male     Boomer   Herbert
## 2195         m         B   Male     Boomer       Ray
## 2196         m         C   Male     Boomer       Tom
## 2197         m         A   Male     Boomer       Lee
## 2198         m         B   Male     Boomer    Alfred
## 2199         m         C   Male     Boomer     Leroy
## 2200         m         A   Male     Boomer     Eddie
## 2201         m         B   Male       GenX      Marc
## 2202         m         C   Male       GenX     Jamie
## 2203         m         A   Male       GenX      Greg
## 2204         m         B   Male       GenX    Darryl
## 2205         m         C   Male       GenX       Tim
## 2206         m         A   Male       GenX      Dean
## 2207         m         B   Male       GenX       Jon
## 2208         m         C   Male       GenX     Chris
## 2209         m         A   Male       GenX      Troy
## 2210         m         B   Male       GenX      Jeff
## 2211         m         C   Male  Millenial   Zachary
```

```
## 2212         m         A   Male  Millenial     Dylan
## 2213         m         B   Male  Millenial Christian
## 2214         m         C   Male  Millenial    Wesley
## 2215         m         A   Male  Millenial      Seth
## 2216         m         B   Male  Millenial    Austin
## 2217         m         C   Male  Millenial   Gabriel
## 2218         m         A   Male  Millenial      Evan
## 2219         m         B   Male  Millenial     Casey
## 2220         m         C   Male  Millenial      Luis
## 2221         m         A Female     Boomer    Gloria
## 2222         m         B Female     Boomer      Joan
## 2223         m         C Female     Boomer   Dorothy
## 2224         m         A Female     Boomer   Shirley
## 2225         m         B Female     Boomer     Betty
## 2226         m         C Female     Boomer    Dianne
## 2227         m         A Female     Boomer       Kay
## 2228         m         B Female     Boomer  Marjorie
## 2229         m         C Female     Boomer  Lorraine
## 2230         m         A Female     Boomer   Mildred
## 2231         m         B Female       GenX     Tracy
## 2232         m         C Female       GenX      Dawn
## 2233         m         A Female       GenX      Tina
## 2234         m         B Female       GenX     Tammy
## 2235         m         C Female       GenX   Melinda
## 2236         m         A Female       GenX    Tamara
## 2237         m         B Female       GenX    Tracey
## 2238         m         C Female       GenX   Colleen
## 2239         m         A Female       GenX    Sherri
## 2240         m         B Female       GenX     Heidi
## 2241         m         C Female  Millenial  Samantha
## 2242         m         A Female  Millenial    Alexis
## 2243         m         B Female  Millenial  Brittany
## 2244         m         C Female  Millenial    Lauren
## 2245         m         A Female  Millenial    Taylor
## 2246         m         B Female  Millenial   Bethany
## 2247         m         C Female  Millenial    Latoya
## 2248         m         A Female  Millenial   Candice
## 2249         m         B Female  Millenial  Brittney
## 2250         m         C Female  Millenial  Cheyenne
## 2251         m         A   Male     Boomer  Theodore
## 2252         m         B   Male     Boomer   Bernard
## 2253         m         C   Male     Boomer      Gene
## 2254         m         A   Male     Boomer   Herbert
## 2255         m         B   Male     Boomer       Ray
## 2256         m         C   Male     Boomer       Tom
## 2257         m         A   Male     Boomer       Lee
## 2258         m         B   Male     Boomer    Alfred
## 2259         m         C   Male     Boomer     Leroy
## 2260         m         A   Male     Boomer     Eddie
## 2261         m         B   Male       GenX      Marc
```

```
## 2262         m         C   Male       GenX     Jamie
## 2263         m         A   Male       GenX      Greg
## 2264         m         B   Male       GenX    Darryl
## 2265         m         C   Male       GenX       Tim
## 2266         m         A   Male       GenX      Dean
## 2267         m         B   Male       GenX       Jon
## 2268         m         C   Male       GenX     Chris
## 2269         m         A   Male       GenX      Troy
## 2270         m         B   Male       GenX      Jeff
## 2271         m         C   Male  Millenial   Zachary
## 2272         m         A   Male  Millenial     Dylan
## 2273         m         B   Male  Millenial Christian
## 2274         m         C   Male  Millenial    Wesley
## 2275         m         A   Male  Millenial      Seth
## 2276         m         B   Male  Millenial    Austin
## 2277         m         C   Male  Millenial   Gabriel
## 2278         m         A   Male  Millenial      Evan
## 2279         m         B   Male  Millenial     Casey
## 2280         m         C   Male  Millenial      Luis
## 2281         m         A Female     Boomer    Gloria
## 2282         m         B Female     Boomer      Joan
## 2283         m         C Female     Boomer   Dorothy
## 2284         m         A Female     Boomer   Shirley
## 2285         m         B Female     Boomer     Betty
## 2286         m         C Female     Boomer    Dianne
## 2287         m         A Female     Boomer       Kay
## 2288         m         B Female     Boomer  Marjorie
## 2289         m         C Female     Boomer  Lorraine
## 2290         m         A Female     Boomer   Mildred
## 2291         m         B Female       GenX     Tracy
## 2292         m         C Female       GenX      Dawn
## 2293         m         A Female       GenX      Tina
## 2294         m         B Female       GenX     Tammy
## 2295         m         C Female       GenX   Melinda
## 2296         m         A Female       GenX    Tamara
## 2297         m         B Female       GenX    Tracey
## 2298         m         C Female       GenX   Colleen
## 2299         m         A Female       GenX    Sherri
## 2300         m         B Female       GenX     Heidi
## 2301         m         C Female  Millenial  Samantha
## 2302         m         A Female  Millenial    Alexis
## 2303         m         B Female  Millenial  Brittany
## 2304         m         C Female  Millenial    Lauren
## 2305         m         A Female  Millenial    Taylor
## 2306         m         B Female  Millenial   Bethany
## 2307         m         C Female  Millenial    Latoya
## 2308         m         A Female  Millenial   Candice
## 2309         m         B Female  Millenial  Brittney
## 2310         m         C Female  Millenial  Cheyenne
## 2311         m         A   Male     Boomer  Theodore
```

```
## 2312         m         B   Male     Boomer   Bernard
## 2313         m         C   Male     Boomer      Gene
## 2314         m         A   Male     Boomer   Herbert
## 2315         m         B   Male     Boomer       Ray
## 2316         m         C   Male     Boomer       Tom
## 2317         m         A   Male     Boomer       Lee
## 2318         m         B   Male     Boomer    Alfred
## 2319         m         C   Male     Boomer     Leroy
## 2320         m         A   Male     Boomer     Eddie
## 2321         m         B   Male       GenX      Marc
## 2322         m         C   Male       GenX     Jamie
## 2323         m         A   Male       GenX      Greg
## 2324         m         B   Male       GenX    Darryl
## 2325         m         C   Male       GenX       Tim
## 2326         m         A   Male       GenX      Dean
## 2327         m         B   Male       GenX       Jon
## 2328         m         C   Male       GenX     Chris
## 2329         m         A   Male       GenX      Troy
## 2330         m         B   Male       GenX      Jeff
## 2331         m         C   Male  Millenial   Zachary
## 2332         m         A   Male  Millenial     Dylan
## 2333         m         B   Male  Millenial Christian
## 2334         m         C   Male  Millenial    Wesley
## 2335         m         A   Male  Millenial      Seth
## 2336         m         B   Male  Millenial    Austin
## 2337         m         C   Male  Millenial   Gabriel
## 2338         m         A   Male  Millenial      Evan
## 2339         m         B   Male  Millenial     Casey
## 2340         m         C   Male  Millenial      Luis
## 2341         n         A Female     Boomer    Gloria
## 2342         n         B Female     Boomer      Joan
## 2343         n         C Female     Boomer   Dorothy
## 2344         n         A Female     Boomer   Shirley
## 2345         n         B Female     Boomer     Betty
## 2346         n         C Female     Boomer    Dianne
## 2347         n         A Female     Boomer       Kay
## 2348         n         B Female     Boomer  Marjorie
## 2349         n         C Female     Boomer  Lorraine
## 2350         n         A Female     Boomer   Mildred
## 2351         n         B Female       GenX     Tracy
## 2352         n         C Female       GenX      Dawn
## 2353         n         A Female       GenX      Tina
## 2354         n         B Female       GenX     Tammy
## 2355         n         C Female       GenX   Melinda
## 2356         n         A Female       GenX    Tamara
## 2357         n         B Female       GenX    Tracey
## 2358         n         C Female       GenX   Colleen
## 2359         n         A Female       GenX    Sherri
## 2360         n         B Female       GenX     Heidi
## 2361         n         C Female  Millenial  Samantha
```

```
## 2362         n         A Female  Millenial    Alexis
## 2363         n         B Female  Millenial  Brittany
## 2364         n         C Female  Millenial    Lauren
## 2365         n         A Female  Millenial    Taylor
## 2366         n         B Female  Millenial   Bethany
## 2367         n         C Female  Millenial    Latoya
## 2368         n         A Female  Millenial   Candice
## 2369         n         B Female  Millenial  Brittney
## 2370         n         C Female  Millenial  Cheyenne
## 2371         n         A   Male     Boomer  Theodore
## 2372         n         B   Male     Boomer   Bernard
## 2373         n         C   Male     Boomer      Gene
## 2374         n         A   Male     Boomer   Herbert
## 2375         n         B   Male     Boomer       Ray
## 2376         n         C   Male     Boomer       Tom
## 2377         n         A   Male     Boomer       Lee
## 2378         n         B   Male     Boomer    Alfred
## 2379         n         C   Male     Boomer     Leroy
## 2380         n         A   Male     Boomer     Eddie
## 2381         n         B   Male       GenX      Marc
## 2382         n         C   Male       GenX     Jamie
## 2383         n         A   Male       GenX      Greg
## 2384         n         B   Male       GenX    Darryl
## 2385         n         C   Male       GenX       Tim
## 2386         n         A   Male       GenX      Dean
## 2387         n         B   Male       GenX       Jon
## 2388         n         C   Male       GenX     Chris
## 2389         n         A   Male       GenX      Troy
## 2390         n         B   Male       GenX      Jeff
## 2391         n         C   Male  Millenial   Zachary
## 2392         n         A   Male  Millenial     Dylan
## 2393         n         B   Male  Millenial Christian
## 2394         n         C   Male  Millenial    Wesley
## 2395         n         A   Male  Millenial      Seth
## 2396         n         B   Male  Millenial    Austin
## 2397         n         C   Male  Millenial   Gabriel
## 2398         n         A   Male  Millenial      Evan
## 2399         n         B   Male  Millenial     Casey
## 2400         n         C   Male  Millenial      Luis
## 2401         n         A Female     Boomer    Gloria
## 2402         n         B Female     Boomer      Joan
## 2403         n         C Female     Boomer   Dorothy
## 2404         n         A Female     Boomer   Shirley
## 2405         n         B Female     Boomer     Betty
## 2406         n         C Female     Boomer    Dianne
## 2407         n         A Female     Boomer       Kay
## 2408         n         B Female     Boomer  Marjorie
## 2409         n         C Female     Boomer  Lorraine
## 2410         n         A Female     Boomer   Mildred
## 2411         n         B Female       GenX     Tracy
```

```
## 2412         n         C Female       GenX      Dawn
## 2413         n         A Female       GenX      Tina
## 2414         n         B Female       GenX     Tammy
## 2415         n         C Female       GenX   Melinda
## 2416         n         A Female       GenX    Tamara
## 2417         n         B Female       GenX    Tracey
## 2418         n         C Female       GenX   Colleen
## 2419         n         A Female       GenX    Sherri
## 2420         n         B Female       GenX     Heidi
## 2421         n         C Female  Millenial  Samantha
## 2422         n         A Female  Millenial    Alexis
## 2423         n         B Female  Millenial  Brittany
## 2424         n         C Female  Millenial    Lauren
## 2425         n         A Female  Millenial    Taylor
## 2426         n         B Female  Millenial   Bethany
## 2427         n         C Female  Millenial    Latoya
## 2428         n         A Female  Millenial   Candice
## 2429         n         B Female  Millenial  Brittney
## 2430         n         C Female  Millenial  Cheyenne
## 2431         n         A   Male     Boomer  Theodore
## 2432         n         B   Male     Boomer   Bernard
## 2433         n         C   Male     Boomer      Gene
## 2434         n         A   Male     Boomer   Herbert
## 2435         n         B   Male     Boomer       Ray
## 2436         n         C   Male     Boomer       Tom
## 2437         n         A   Male     Boomer       Lee
## 2438         n         B   Male     Boomer    Alfred
## 2439         n         C   Male     Boomer     Leroy
## 2440         n         A   Male     Boomer     Eddie
## 2441         n         B   Male       GenX      Marc
## 2442         n         C   Male       GenX     Jamie
## 2443         n         A   Male       GenX      Greg
## 2444         n         B   Male       GenX    Darryl
## 2445         n         C   Male       GenX       Tim
## 2446         n         A   Male       GenX      Dean
## 2447         n         B   Male       GenX       Jon
## 2448         n         C   Male       GenX     Chris
## 2449         n         A   Male       GenX      Troy
## 2450         n         B   Male       GenX      Jeff
## 2451         n         C   Male  Millenial   Zachary
## 2452         n         A   Male  Millenial     Dylan
## 2453         n         B   Male  Millenial Christian
## 2454         n         C   Male  Millenial    Wesley
## 2455         n         A   Male  Millenial      Seth
## 2456         n         B   Male  Millenial    Austin
## 2457         n         C   Male  Millenial   Gabriel
## 2458         n         A   Male  Millenial      Evan
## 2459         n         B   Male  Millenial     Casey
## 2460         n         C   Male  Millenial      Luis
## 2461         n         A Female     Boomer    Gloria
```

```
## 2462         n         B Female     Boomer      Joan
## 2463         n         C Female     Boomer   Dorothy
## 2464         n         A Female     Boomer   Shirley
## 2465         n         B Female     Boomer     Betty
## 2466         n         C Female     Boomer    Dianne
## 2467         n         A Female     Boomer       Kay
## 2468         n         B Female     Boomer  Marjorie
## 2469         n         C Female     Boomer  Lorraine
## 2470         n         A Female     Boomer   Mildred
## 2471         n         B Female       GenX     Tracy
## 2472         n         C Female       GenX      Dawn
## 2473         n         A Female       GenX      Tina
## 2474         n         B Female       GenX     Tammy
## 2475         n         C Female       GenX   Melinda
## 2476         n         A Female       GenX    Tamara
## 2477         n         B Female       GenX    Tracey
## 2478         n         C Female       GenX   Colleen
## 2479         n         A Female       GenX    Sherri
## 2480         n         B Female       GenX     Heidi
## 2481         n         C Female  Millenial  Samantha
## 2482         n         A Female  Millenial    Alexis
## 2483         n         B Female  Millenial  Brittany
## 2484         n         C Female  Millenial    Lauren
## 2485         n         A Female  Millenial    Taylor
## 2486         n         B Female  Millenial   Bethany
## 2487         n         C Female  Millenial    Latoya
## 2488         n         A Female  Millenial   Candice
## 2489         n         B Female  Millenial  Brittney
## 2490         n         C Female  Millenial  Cheyenne
## 2491         n         A   Male     Boomer  Theodore
## 2492         n         B   Male     Boomer   Bernard
## 2493         n         C   Male     Boomer      Gene
## 2494         n         A   Male     Boomer   Herbert
## 2495         n         B   Male     Boomer       Ray
## 2496         n         C   Male     Boomer       Tom
## 2497         n         A   Male     Boomer       Lee
## 2498         n         B   Male     Boomer    Alfred
## 2499         n         C   Male     Boomer     Leroy
## 2500         n         A   Male     Boomer     Eddie
## 2501         n         B   Male       GenX      Marc
## 2502         n         C   Male       GenX     Jamie
## 2503         n         A   Male       GenX      Greg
## 2504         n         B   Male       GenX    Darryl
## 2505         n         C   Male       GenX       Tim
## 2506         n         A   Male       GenX      Dean
## 2507         n         B   Male       GenX       Jon
## 2508         n         C   Male       GenX     Chris
## 2509         n         A   Male       GenX      Troy
## 2510         n         B   Male       GenX      Jeff
## 2511         n         C   Male  Millenial   Zachary
```

```
## 2512         n         A   Male  Millenial     Dylan
## 2513         n         B   Male  Millenial Christian
## 2514         n         C   Male  Millenial    Wesley
## 2515         n         A   Male  Millenial      Seth
## 2516         n         B   Male  Millenial    Austin
## 2517         n         C   Male  Millenial   Gabriel
## 2518         n         A   Male  Millenial      Evan
## 2519         n         B   Male  Millenial     Casey
## 2520         n         C   Male  Millenial      Luis

#                ...
#TO-DO
```

Packages

Install the package `pacman` using regular base R.

```
#install.packages("pacman")
```

First, install the package `testthat` (a widely accepted testing suite for R) from https://github.com/r-lib/testthat using `pacman`. If you are using Windows, this will be a long install, but you have to go through it for some of the stuff we are doing in class. LINUX (or MAC) is preferred for coding. If you can't get it to work, install this package from CRAN (still using `pacman`), but this is not recommended long term.

```
#pacman::p_load(testthat)


#if (!require("pacman")){install.packages("pacman")} #installs pacman if
necessary but does not load it!
#pacman::p_load(testthat)
```

- Create vector `v` consisting of all numbers from -100 to 100 and test using the second line of code su

```
v= seq(-100, 100)
#expect_equal(v, -100 : 101) #from the pakage, good for texting
#will get an error
#Error: `v` not equal to -100:101. Lengths differ: 201 is not 202
```

If there are any errors, the `expect_equal` function will tell you about them. If there are no errors, then it will be silent.

Test the `my_reverse` function from lab2 using the following code:

```
v =1:20
#expect_equal(my_rev(v), rev(v))
#expect_equal(my_rev(c("A", "B", "C")), c("C", "B", "A"))


# Error: my_rev(v) not equal to rev(v). Attributes: < Modes: list, NULL >
```

```
Attributes: < Lengths: 1, 0 > Attributes: < names for target but not for
current > Attributes: < current is not list-like > we got this error
initially because my_rev used an array and not rep. an array is not a numeric
class thus the function expect_equal did not recognize my_rev and rev to be
equal
```

Multinomial Classification using KNN

Write a $k = 1$ nearest neighbor algorithm using the Euclidean distance function. This is standard "Roxygen" format for documentation. Hopefully, we will get to packages at some point and we will go over this again. It is your job also to fill in this documentation.

```
#' TO-DO: Provide a name for this function
#' one nearest neighbor classifier
#' TO-DO: Explain what this function does in a few sentences
#' classifies an observation based on the label of closet observations in the
set of training observation.
#'
#' @param Xinput      TO-DO: A matrix of features for training data
observations
#' @param y_binary    TO-DO: The vector of training data labels
#' @param Xtest       TO-DO: A test observation as a row vector
#' @param d           TO-DO: a distance function which takes an input of two
different row vectors
#' @return            TO-DO: the predicted label of the test observation
nn_algorithm_predict = function(Xinput, y_binary, xtest, d = function(v1,
v2){ sum(Xinput[i,]- xtest)^2 }) {
  n= nrow(Xinput)
  distances =array(NA,n)

  for(i in 1:n){
    #we need to calc the euclidean distance between ith row and x test
    #distances[i] = sum(Xinput[i,]- xtest)^2 # the dif in each dim(features)
    #what is euclidean distance... we want the dif of squares, we can square
the whole vector
    #we need to find the min

    #new
    distance[i]= d(Xinput[i,], xtest)

  }
   y_binary[which.min(distances)]

}
```

Write a few tests to ensure it actually works:

```
#M= matrix[data =c(rpois(50,0.5)), nrow= 5, ncol=10]
```

We now add an argument `d` representing any legal distance function to the `nn_algorithm_predict` function. Update the implementation so it performs NN using that distance function. Set the default function to be the Euclidean distance in the original function. Also, alter the documentation in the appropriate places.

```
#TO-DO
#d = function(v1, v2){ sum(Xinput[i,]- xtest)^2
```

For extra credit (unless you're a masters student), add an argument `k` to the `nn_algorithm_predict` function and update the implementation so it performs KNN. In the case of a tie, choose $\hat{y}$ randomly. Set the default `k` to be the square root of the size of $\mathcal{D}$ which is an empirical rule-of-thumb popularized by the "Pattern Classification" book by Duda, Hart and Stork (2007). Also, alter the documentation in the appropriate places.

```
#TO-DO for the 650 students but extra credit for undergrads add k as an
argument
```

Basic Binary Classification Modeling

- Load the famous `iris` data frame into the namespace. Provide a summary of the columns using the `skim` function in package `skimr` and write a few descriptive sentences about the distributions using the code below and in English.

```
data(iris)
pacman::p_load(skimr)
  #install.packages("skimr")
  #skimr::skim(iris)
skim(iris)
```

Data summary

Name	iris
Number of rows	150
Number of columns	5

Column type frequency:

factor	1
numeric	4

Group variables	None

Variable type: factor

skim_variable	n_missing	complete_rate	ordered	n_unique	top_counts
Species	0	1	FALSE	3	set: 50, ver: 50, vir: 50

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
Sepal.Length	0	1	5.84	0.83	4.3	5.1	5.80	6.4	7.9	▆▇▅▂
Sepal.Width	0	1	3.06	0.44	2.0	2.8	3.00	3.3	4.4	▁▃▇▂▁
Petal.Length	0	1	3.76	1.77	1.0	1.6	4.35	5.1	6.9	▇▁▆▇▂
Petal.Width	0	1	1.20	0.76	0.1	0.3	1.30	1.8	2.5	▇▁▆▂▂

```
rm(list = ls())
data(iris) #load the iris dataset (as a data frame). This dataset is included
in the package "datasets" which is autoloaded print("summary")

summary(iris)

##   Sepal.Length    Sepal.Width     Petal.Length    Petal.Width
##  Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
##  1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
##  Median :5.800   Median :3.000   Median :4.350   Median :1.300
##  Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
##  3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
##  Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
##        Species
##  setosa    :50
##  versicolor:50
##  virginica :50
##
##
##

#data.frame(iris)
```

TO-DO: describe this data the data is classified based on the different spices and the different features(the measurements of petals).

The outcome / label / response is `Species`. This is what we will be trying to predict. However, we only care about binary classification between “setosa” and “versicolor” for the purposes of this exercise. Thus the first order of business is to drop one class. Let’s drop the data for the level “virginica” from the data frame.

```
#iris[iris$Species != "virginica"] #we only want some of the rows... we want
not virginica
#how do we extract the species vector from the data frame
#iris[iris$Species] #n cols of species
iris =iris[iris$Species !="virginica", ]
```

```
#//was missing the , smh
#levels(iris$Species =="virginica")
```

Now create a vector y that is length the number of remaining rows in the data frame whose entries are 0 if “setosa” and 1 if “versicolor”.

```
y= as.numeric(iris$Species =="setosa")

y
```

```
##   [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [38] 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

- Write a function mode returning the sample mode.

```
  mode <- function(v) {
  sorted_counts <- sort(table(v), decreasing = TRUE)
  names(sorted_counts[1])
}
mode(y) #should be zero?...
```

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

```
              * Fit a threshold model to `y` using the feature
`Sepal.Length`. Write your own code to do this. What is the estimated value
of the threshold parameter? Save the threshold value as `threshold`.


                  #TO-DO
threshold_model<-function(y){
n=length(y)
total_sum_error=0;
num_errors_by_Sepal.Length =matrix(NA, nrow=n, ncol=2)
colnames(num_errors_by_Sepal.Length)=c("threshold_by_Sepal.Length",
"num_errors")

y_logical =iris$Sepal.Length== sum(iris$Sepal.Length)/n
for(i in 1:n){
  threshold = iris$Sepal.Length[i]
  num_errors =sum((iris$Sepal.Length> threshold)!=y_logical)
  num_errors_by_Sepal.Length[i,]=c(threshold, num_errors)
  total_sum_error = num_errors+ total_sum_error
}

print(num_errors_by_Sepal.Length)
cat("total error: " , total_sum_error)

}
```

```
threshold_model(y)
```

```
##        threshold_by_Sepal.Length num_errors
##   [1,]                       5.1         60
##   [2,]                       4.9         79
##   [3,]                       4.7         89
##   [4,]                       4.6         91
##   [5,]                       5.0         69
##   [6,]                       5.4         49
##   [7,]                       4.6         91
##   [8,]                       5.0         69
##   [9,]                       4.4         96
##  [10,]                       4.9         79
##  [11,]                       5.4         49
##  [12,]                       4.8         84
##  [13,]                       4.8         84
##  [14,]                       4.3         99
##  [15,]                       5.8         26
##  [16,]                       5.7         30
##  [17,]                       5.4         49
##  [18,]                       5.1         60
##  [19,]                       5.7         30
##  [20,]                       5.1         60
##  [21,]                       5.4         49
##  [22,]                       5.1         60
##  [23,]                       4.6         91
##  [24,]                       5.1         60
##  [25,]                       4.8         84
##  [26,]                       5.0         69
##  [27,]                       5.0         69
##  [28,]                       5.2         56
##  [29,]                       5.2         56
##  [30,]                       4.7         89
##  [31,]                       4.8         84
##  [32,]                       5.4         49
##  [33,]                       5.2         56
##  [34,]                       5.5         42
##  [35,]                       4.9         79
##  [36,]                       5.0         69
##  [37,]                       5.5         42
##  [38,]                       4.9         79
##  [39,]                       4.4         96
##  [40,]                       5.1         60
##  [41,]                       5.0         69
##  [42,]                       4.5         95
##  [43,]                       4.4         96
##  [44,]                       5.0         69
##  [45,]                       5.1         60
##  [46,]                       4.8         84
```

```
##  [47,]                      5.1         60
##  [48,]                      4.6         91
##  [49,]                      5.3         55
##  [50,]                      5.0         69
##  [51,]                      7.0          0
##  [52,]                      6.4          9
##  [53,]                      6.9          1
##  [54,]                      5.5         42
##  [55,]                      6.5          8
##  [56,]                      5.7         30
##  [57,]                      6.3         11
##  [58,]                      4.9         79
##  [59,]                      6.6          6
##  [60,]                      5.2         56
##  [61,]                      5.0         69
##  [62,]                      5.9         24
##  [63,]                      6.0         20
##  [64,]                      6.1         16
##  [65,]                      5.6         37
##  [66,]                      6.7          3
##  [67,]                      5.6         37
##  [68,]                      5.8         26
##  [69,]                      6.2         14
##  [70,]                      5.6         37
##  [71,]                      5.9         24
##  [72,]                      6.1         16
##  [73,]                      6.3         11
##  [74,]                      6.1         16
##  [75,]                      6.4          9
##  [76,]                      6.6          6
##  [77,]                      6.8          2
##  [78,]                      6.7          3
##  [79,]                      6.0         20
##  [80,]                      5.7         30
##  [81,]                      5.5         42
##  [82,]                      5.5         42
##  [83,]                      5.8         26
##  [84,]                      6.0         20
##  [85,]                      5.4         49
##  [86,]                      6.0         20
##  [87,]                      6.7          3
##  [88,]                      6.3         11
##  [89,]                      5.6         37
##  [90,]                      5.5         42
##  [91,]                      5.5         42
##  [92,]                      6.1         16
##  [93,]                      5.8         26
##  [94,]                      5.0         69
##  [95,]                      5.6         37
##  [96,]                      5.7         30
```

```
##  [97,]                        5.7         30
##  [98,]                        6.2         14
##  [99,]                        5.1         60
## [100,]                        5.7         30
## total error:  4738
```

What is the total number of errors this model makes?

```
#total error is 4738
```

Does the threshold model's performance make sense given the following summaries:

```
summary(iris[iris$Species == "setosa", "Sepal.Length"])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   4.300   4.800   5.000   5.006   5.200   5.800
```

```
summary(iris[iris$Species == "versicolor", "Sepal.Length"])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   4.900   5.600   5.900   5.936   6.300   7.000
```

```
# yes because the max is 7 with an error of 0
```

TO-DO: Write your answer here in English. The means are expected because they are around the avarge of the first and last quartiles.

Create the function g explicitly that can predict y from x being a new `Sepal.Length`.

```
g = function(x){
  ifelse(x>threshold, 1,0)
}
```

Perceptron

You will code the "perceptron learning algorithm" for arbitrary number of features p. Take a look at the comments above the function. Respect the spec below:

```
#' TO-DO: Provide a name for this function
#      neural network model
#' TO-DO: Explain what this function does in a few sentences
#'
#' @param Xinput      TO-DO: matrix of data
#' @param y_binary    TO-DO: training binary data
#' @param MAX_ITER    TO-DO: line of best seperation
#' @param w           TO-DO: prameters
#'
#' @return            The computed final parameter (weight) as a vector of
length p + 1
perceptron_learning_algorithm = function(Xinput, y_binary, MAX_ITER = 1000, w
```

```
= NULL){
  #TO-DO
}
```

To understand what the algorithm is doing - linear "discrimination" between two response categories, we can draw a picture. First let's make up some very simple training data $\mathbb{D}$.

```
Xy_simple = data.frame(
 response = factor(c(0, 0, 0, 1, 1, 1)), #nominal
 first_feature = c(1, 1, 2, 3, 3, 4),    #continuous
 second_feature = c(1, 2, 1, 3, 4, 3)    #continuous
)
```

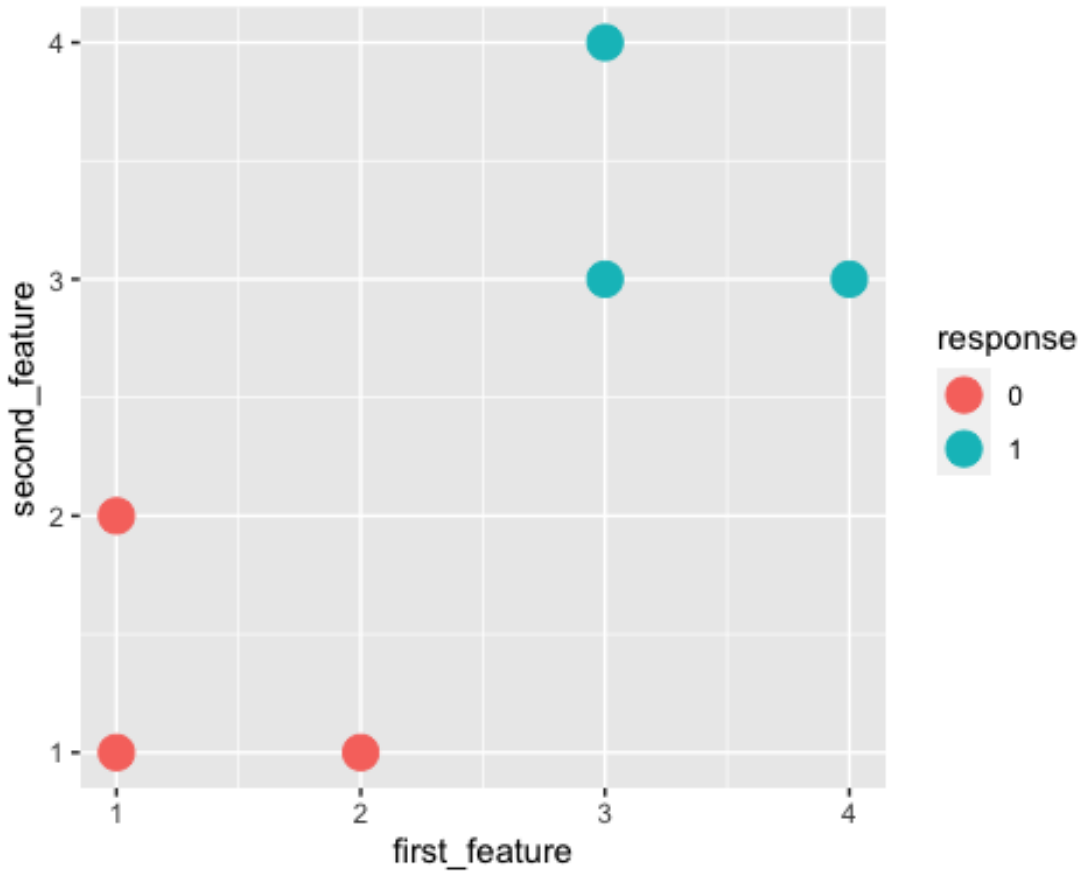
We haven't spoken about visualization yet, but it is important we do some of it now. Thus, I will write this code for you and you will just run it. First we load the visualization library we're going to use:

```
pacman::p_load(ggplot2)
```

We are going to just get some plots and not talk about the code to generate them as we will have a whole unit on visualization using `ggplot2` in the future.

Let's first plot y by the two features so the coordinate plane will be the two features and we use different colors to represent the third dimension, y.

```
simple_viz_obj = ggplot(Xy_simple, aes(x = first_feature, y = second_feature,
color = response)) +
geom_point(size = 5)
simple_viz_obj
```



TO-DO: Explain this picture.

Now, let us run the algorithm and see what happens:

```
w_vec_simple_per = perceptron_learning_algorithm(
cbind(Xy_simple$first_feature, Xy_simple$second_feature),
as.numeric(Xy_simple$response == 1))
w_vec_simple_per
```

```
## NULL
```

Explain this output. What do the numbers mean? What is the intercept of this line and the slope? You will have to do some algebra.

TO-DO

```
#simple_perceptron_line = geom_abline(
#  intercept = -w_vec_simple_per[1] / w_vec_simple_per[3],
#  slope = -w_vec_simple_per[2] / w_vec_simple_per[3],
#  color = "orange")
#simple_viz_obj + simple_perceptron_line
```

Explain this picture. Why is this line of separation not “satisfying” to you?

TO-DO

For extra credit, program the maximum-margin hyperplane perceptron that provides the best linear discrimination model for linearly separable data. Make sure you provide ROxygen documentation for this function.

```
#TO-DO
```