

# Lab02

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## More Basic R Skills

- Create a function `my_reverse` which takes as required input a vector `v` 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.

```
v = 1:100
my_reverse = function(v){
  n = length(v)
  vr = array(NA, n)
  for(i in 1:n){
    vr[i] = v[n -i +1]
  }
  vr
}
my_reverse(v)
```

```
##   [1] 100  99  98  97  96  95  94  93  92  91  90  89  88  87  86  85  84  83
##  [19]  82  81  80  79  78  77  76  75  74  73  72  71  70  69  68  67  66  65
##  [37]  64  63  62  61  60  59  58  57  56  55  54  53  52  51  50  49  48  47
##  [55]  46  45  44  43  42  41  40  39  38  37  36  35  34  33  32  31  30  29
##  [73]  28  27  26  25  24  23  22  21  20  19  18  17  16  15  14  13  12  11
##  [91]  10   9   8   7   6   5   4   3   2   1
```

*#TO-DO*

- 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. If the number of rows is equal to the number of columns, throw an error.

```
flip_matrix = function(X, dim_to_rev = NA){
  nr = nrow(X)
  nc = ncol(X)
  if(is.na(dim_to_rev)){
    if(nr == nc){
      stop("unspecified dim_to_rev and rows equal columns")
    }
    if (nr > nc) {
      dim_to_rev = "r"
    }else{
      dim_to_rev = "c"
    }
  }
}
```

```

    }
  }
  if (dim_to_rev == "r"){
    X[nr:1,]
  }else if(dim_to_rev == "c"){
    X[,nc:1]
  }else{
    stop("dim_to_rev needs to be r or c")
  }
}
}
## To Test that the function works:
v = 1:17
my_reverse(v)

```

```
## [1] 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
```

- 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.

```
my_list = list()##TO-DO
```

```

for(i in 1:8){
  my_list[[LETTERS[i]]] = array(1:(i**i), dim = rep(i,i))
}

```

Run the following code:

```
lapply(my_list, object.size)
```

```

## $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?

`?object.size` the `object.size` function provides an estimate for the amount of memory being used to store an

R object.

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

```
rm(list = ls()) #TO-DO
```

## 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  
strsplit(lorem, split = "\\s")
```

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

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

- 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.

```
my_list= list()  
my_list$m= list()  
my_list$f= list()  
my_list$m$Boomer = strsplit("Theodore, Bernard, Gene, Herbert, Ray, Tom, Lee, Alfred, Leroy, Eddie", sp  
my_list$m$GenX = strsplit("Marc, Jamie, Greg, Darryl, Tim, Dean, Jon, Chris, Troy, Jeff", split = ", ")  
my_list$m$Millennial = strsplit("Zachary, Dylan, Christian, Wesley, Seth, Austin, Gabriel, Evan, Casey, Luis", split = ", ")  
my_list$f$Boomer = strsplit("Gloria, Joan, Dorothy, Shirley, Betty, Dianne, Kay, Marjorie, Lorraine, Mi  
my_list$f$GenX = strsplit("Tracy, Dawn, Tina, Tammy, Melinda, Tamara, Tracey, Colleen, Sherri, Heidi",  
my_list$f$Millennial = strsplit("Samantha, Alexis, Brittany, Lauren, Taylor, Bethany, Latoya, Candice, L  
my_list  
  
## $m  
## list()  
##  
## $f  
## list()  
##  
## $M  
## $M$Boomer
```

```
## [1] "Theodore" "Bernard" "Gene"      "Herbert" "Ray"      "Tom"
## [7] "Lee"      "Alfred"   "Leroy"    "Eddie"
##
## $M$GenX
## [1] "Marc"    "Jamie"   "Greg"     "Darryl"  "Tim"      "Dean"    "Jon"     "Chris"
## [9] "Troy"    "Jeff"
##
## $M$Millennial
## [1] "Marc"    "Jamie"   "Greg"     "Darryl"  "Tim"      "Dean"    "Jon"     "Chris"
## [9] "Troy"    "Jeff"
##
##
## $F
## $F$Boomer
## [1] "Gloria"   "Joan"     "Dorothy"  "Shirley" "Betty"    "Dianne"
## [7] "Kay"      "Marjorie" "Lorraine" "Mildred"
##
## $F$GenX
## [1] "Tracy"    "Dawn"     "Tina"     "Tammy"   "Melinda"  "Tamara"  "Tracey"
## [8] "Colleen"  "Sherri"   "Heidi"
##
## $F$Millennial
## [1] "Samantha" "Alexis"   "Brittany" "Lauren"  "Taylor"   "Bethany"
## [7] "Latoya"   "Candice"  "Brittney" "Cheyenne"
```

*#HINT:*

```
#strsplit("Theodore, Bernard, Gene, Herbert, Ray, Tom, Lee, Alfred, Leroy, Eddie", split = ", ")[[1]]
#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. Hint, we’ve been using the `rep` function using the `times` argument. Look at the each argument using `?rep`.

```
n = 14 * 3 * 2 * 3 * 10
X = data.frame(treatment = rep(NA,n), variation = rep(NA,n), gender = rep(NA,n),
               generation = rep(NA,n), name = rep(NA,n), y = rep(NA,n))
X$treatment = rep(letters [1:14], each = n/14)
X$variation = rep(rep(LETTERS[1:3], each = n/14/3), times = 14)
X$gender = rep(rep(c("M", "F"), each = n/14/3/2), times = 14)
X$generation = rep(rep(c("Boomer", "GenX", "Millenial"), each = n/14/3/2/3), times = 14*3*2)
X$name = rep(unlist(n), times = 14 * 3)
X
```

```
##      treatment variation gender generation name  y
## 1           a          A      M      Boomer 2520 NA
## 2           a          A      M      Boomer 2520 NA
## 3           a          A      M      Boomer 2520 NA
## 4           a          A      M      Boomer 2520 NA
```

## 5	a	A	M	Boomer	2520	NA
## 6	a	A	M	Boomer	2520	NA
## 7	a	A	M	Boomer	2520	NA
## 8	a	A	M	Boomer	2520	NA
## 9	a	A	M	Boomer	2520	NA
## 10	a	A	M	Boomer	2520	NA
## 11	a	A	M	GenX	2520	NA
## 12	a	A	M	GenX	2520	NA
## 13	a	A	M	GenX	2520	NA
## 14	a	A	M	GenX	2520	NA
## 15	a	A	M	GenX	2520	NA
## 16	a	A	M	GenX	2520	NA
## 17	a	A	M	GenX	2520	NA
## 18	a	A	M	GenX	2520	NA
## 19	a	A	M	GenX	2520	NA
## 20	a	A	M	GenX	2520	NA
## 21	a	A	M	Millennial	2520	NA
## 22	a	A	M	Millennial	2520	NA
## 23	a	A	M	Millennial	2520	NA
## 24	a	A	M	Millennial	2520	NA
## 25	a	A	M	Millennial	2520	NA
## 26	a	A	M	Millennial	2520	NA
## 27	a	A	M	Millennial	2520	NA
## 28	a	A	M	Millennial	2520	NA
## 29	a	A	M	Millennial	2520	NA
## 30	a	A	M	Millennial	2520	NA
## 31	a	A	F	Boomer	2520	NA
## 32	a	A	F	Boomer	2520	NA
## 33	a	A	F	Boomer	2520	NA
## 34	a	A	F	Boomer	2520	NA
## 35	a	A	F	Boomer	2520	NA
## 36	a	A	F	Boomer	2520	NA
## 37	a	A	F	Boomer	2520	NA
## 38	a	A	F	Boomer	2520	NA
## 39	a	A	F	Boomer	2520	NA
## 40	a	A	F	Boomer	2520	NA
## 41	a	A	F	GenX	2520	NA
## 42	a	A	F	GenX	2520	NA
## 43	a	A	F	GenX	2520	NA
## 44	a	A	F	GenX	2520	NA
## 45	a	A	F	GenX	2520	NA
## 46	a	A	F	GenX	2520	NA
## 47	a	A	F	GenX	2520	NA
## 48	a	A	F	GenX	2520	NA
## 49	a	A	F	GenX	2520	NA
## 50	a	A	F	GenX	2520	NA
## 51	a	A	F	Millennial	2520	NA
## 52	a	A	F	Millennial	2520	NA
## 53	a	A	F	Millennial	2520	NA
## 54	a	A	F	Millennial	2520	NA
## 55	a	A	F	Millennial	2520	NA
## 56	a	A	F	Millennial	2520	NA
## 57	a	A	F	Millennial	2520	NA
## 58	a	A	F	Millennial	2520	NA

## 59	a	A	F	Millenial	2520	NA
## 60	a	A	F	Millenial	2520	NA
## 61	a	B	M	Boomer	2520	NA
## 62	a	B	M	Boomer	2520	NA
## 63	a	B	M	Boomer	2520	NA
## 64	a	B	M	Boomer	2520	NA
## 65	a	B	M	Boomer	2520	NA
## 66	a	B	M	Boomer	2520	NA
## 67	a	B	M	Boomer	2520	NA
## 68	a	B	M	Boomer	2520	NA
## 69	a	B	M	Boomer	2520	NA
## 70	a	B	M	Boomer	2520	NA
## 71	a	B	M	GenX	2520	NA
## 72	a	B	M	GenX	2520	NA
## 73	a	B	M	GenX	2520	NA
## 74	a	B	M	GenX	2520	NA
## 75	a	B	M	GenX	2520	NA
## 76	a	B	M	GenX	2520	NA
## 77	a	B	M	GenX	2520	NA
## 78	a	B	M	GenX	2520	NA
## 79	a	B	M	GenX	2520	NA
## 80	a	B	M	GenX	2520	NA
## 81	a	B	M	Millenial	2520	NA
## 82	a	B	M	Millenial	2520	NA
## 83	a	B	M	Millenial	2520	NA
## 84	a	B	M	Millenial	2520	NA
## 85	a	B	M	Millenial	2520	NA
## 86	a	B	M	Millenial	2520	NA
## 87	a	B	M	Millenial	2520	NA
## 88	a	B	M	Millenial	2520	NA
## 89	a	B	M	Millenial	2520	NA
## 90	a	B	M	Millenial	2520	NA
## 91	a	B	F	Boomer	2520	NA
## 92	a	B	F	Boomer	2520	NA
## 93	a	B	F	Boomer	2520	NA
## 94	a	B	F	Boomer	2520	NA
## 95	a	B	F	Boomer	2520	NA
## 96	a	B	F	Boomer	2520	NA
## 97	a	B	F	Boomer	2520	NA
## 98	a	B	F	Boomer	2520	NA
## 99	a	B	F	Boomer	2520	NA
## 100	a	B	F	Boomer	2520	NA
## 101	a	B	F	GenX	2520	NA
## 102	a	B	F	GenX	2520	NA
## 103	a	B	F	GenX	2520	NA
## 104	a	B	F	GenX	2520	NA
## 105	a	B	F	GenX	2520	NA
## 106	a	B	F	GenX	2520	NA
## 107	a	B	F	GenX	2520	NA
## 108	a	B	F	GenX	2520	NA
## 109	a	B	F	GenX	2520	NA
## 110	a	B	F	GenX	2520	NA
## 111	a	B	F	Millenial	2520	NA
## 112	a	B	F	Millenial	2520	NA

## 113	a	B	F	Millenial	2520	NA
## 114	a	B	F	Millenial	2520	NA
## 115	a	B	F	Millenial	2520	NA
## 116	a	B	F	Millenial	2520	NA
## 117	a	B	F	Millenial	2520	NA
## 118	a	B	F	Millenial	2520	NA
## 119	a	B	F	Millenial	2520	NA
## 120	a	B	F	Millenial	2520	NA
## 121	a	C	M	Boomer	2520	NA
## 122	a	C	M	Boomer	2520	NA
## 123	a	C	M	Boomer	2520	NA
## 124	a	C	M	Boomer	2520	NA
## 125	a	C	M	Boomer	2520	NA
## 126	a	C	M	Boomer	2520	NA
## 127	a	C	M	Boomer	2520	NA
## 128	a	C	M	Boomer	2520	NA
## 129	a	C	M	Boomer	2520	NA
## 130	a	C	M	Boomer	2520	NA
## 131	a	C	M	GenX	2520	NA
## 132	a	C	M	GenX	2520	NA
## 133	a	C	M	GenX	2520	NA
## 134	a	C	M	GenX	2520	NA
## 135	a	C	M	GenX	2520	NA
## 136	a	C	M	GenX	2520	NA
## 137	a	C	M	GenX	2520	NA
## 138	a	C	M	GenX	2520	NA
## 139	a	C	M	GenX	2520	NA
## 140	a	C	M	GenX	2520	NA
## 141	a	C	M	Millenial	2520	NA
## 142	a	C	M	Millenial	2520	NA
## 143	a	C	M	Millenial	2520	NA
## 144	a	C	M	Millenial	2520	NA
## 145	a	C	M	Millenial	2520	NA
## 146	a	C	M	Millenial	2520	NA
## 147	a	C	M	Millenial	2520	NA
## 148	a	C	M	Millenial	2520	NA
## 149	a	C	M	Millenial	2520	NA
## 150	a	C	M	Millenial	2520	NA
## 151	a	C	F	Boomer	2520	NA
## 152	a	C	F	Boomer	2520	NA
## 153	a	C	F	Boomer	2520	NA
## 154	a	C	F	Boomer	2520	NA
## 155	a	C	F	Boomer	2520	NA
## 156	a	C	F	Boomer	2520	NA
## 157	a	C	F	Boomer	2520	NA
## 158	a	C	F	Boomer	2520	NA
## 159	a	C	F	Boomer	2520	NA
## 160	a	C	F	Boomer	2520	NA
## 161	a	C	F	GenX	2520	NA
## 162	a	C	F	GenX	2520	NA
## 163	a	C	F	GenX	2520	NA
## 164	a	C	F	GenX	2520	NA
## 165	a	C	F	GenX	2520	NA
## 166	a	C	F	GenX	2520	NA

## 167	a	C	F	GenX	2520	NA
## 168	a	C	F	GenX	2520	NA
## 169	a	C	F	GenX	2520	NA
## 170	a	C	F	GenX	2520	NA
## 171	a	C	F	Millennial	2520	NA
## 172	a	C	F	Millennial	2520	NA
## 173	a	C	F	Millennial	2520	NA
## 174	a	C	F	Millennial	2520	NA
## 175	a	C	F	Millennial	2520	NA
## 176	a	C	F	Millennial	2520	NA
## 177	a	C	F	Millennial	2520	NA
## 178	a	C	F	Millennial	2520	NA
## 179	a	C	F	Millennial	2520	NA
## 180	a	C	F	Millennial	2520	NA
## 181	b	A	M	Boomer	2520	NA
## 182	b	A	M	Boomer	2520	NA
## 183	b	A	M	Boomer	2520	NA
## 184	b	A	M	Boomer	2520	NA
## 185	b	A	M	Boomer	2520	NA
## 186	b	A	M	Boomer	2520	NA
## 187	b	A	M	Boomer	2520	NA
## 188	b	A	M	Boomer	2520	NA
## 189	b	A	M	Boomer	2520	NA
## 190	b	A	M	Boomer	2520	NA
## 191	b	A	M	GenX	2520	NA
## 192	b	A	M	GenX	2520	NA
## 193	b	A	M	GenX	2520	NA
## 194	b	A	M	GenX	2520	NA
## 195	b	A	M	GenX	2520	NA
## 196	b	A	M	GenX	2520	NA
## 197	b	A	M	GenX	2520	NA
## 198	b	A	M	GenX	2520	NA
## 199	b	A	M	GenX	2520	NA
## 200	b	A	M	GenX	2520	NA
## 201	b	A	M	Millennial	2520	NA
## 202	b	A	M	Millennial	2520	NA
## 203	b	A	M	Millennial	2520	NA
## 204	b	A	M	Millennial	2520	NA
## 205	b	A	M	Millennial	2520	NA
## 206	b	A	M	Millennial	2520	NA
## 207	b	A	M	Millennial	2520	NA
## 208	b	A	M	Millennial	2520	NA
## 209	b	A	M	Millennial	2520	NA
## 210	b	A	M	Millennial	2520	NA
## 211	b	A	F	Boomer	2520	NA
## 212	b	A	F	Boomer	2520	NA
## 213	b	A	F	Boomer	2520	NA
## 214	b	A	F	Boomer	2520	NA
## 215	b	A	F	Boomer	2520	NA
## 216	b	A	F	Boomer	2520	NA
## 217	b	A	F	Boomer	2520	NA
## 218	b	A	F	Boomer	2520	NA
## 219	b	A	F	Boomer	2520	NA
## 220	b	A	F	Boomer	2520	NA



## 221	b	A	F	GenX	2520	NA
## 222	b	A	F	GenX	2520	NA
## 223	b	A	F	GenX	2520	NA
## 224	b	A	F	GenX	2520	NA
## 225	b	A	F	GenX	2520	NA
## 226	b	A	F	GenX	2520	NA
## 227	b	A	F	GenX	2520	NA
## 228	b	A	F	GenX	2520	NA
## 229	b	A	F	GenX	2520	NA
## 230	b	A	F	GenX	2520	NA
## 231	b	A	F	Millenial	2520	NA
## 232	b	A	F	Millenial	2520	NA
## 233	b	A	F	Millenial	2520	NA
## 234	b	A	F	Millenial	2520	NA
## 235	b	A	F	Millenial	2520	NA
## 236	b	A	F	Millenial	2520	NA
## 237	b	A	F	Millenial	2520	NA
## 238	b	A	F	Millenial	2520	NA
## 239	b	A	F	Millenial	2520	NA
## 240	b	A	F	Millenial	2520	NA
## 241	b	B	M	Boomer	2520	NA
## 242	b	B	M	Boomer	2520	NA
## 243	b	B	M	Boomer	2520	NA
## 244	b	B	M	Boomer	2520	NA
## 245	b	B	M	Boomer	2520	NA
## 246	b	B	M	Boomer	2520	NA
## 247	b	B	M	Boomer	2520	NA
## 248	b	B	M	Boomer	2520	NA
## 249	b	B	M	Boomer	2520	NA
## 250	b	B	M	Boomer	2520	NA
## 251	b	B	M	GenX	2520	NA
## 252	b	B	M	GenX	2520	NA
## 253	b	B	M	GenX	2520	NA
## 254	b	B	M	GenX	2520	NA
## 255	b	B	M	GenX	2520	NA
## 256	b	B	M	GenX	2520	NA
## 257	b	B	M	GenX	2520	NA
## 258	b	B	M	GenX	2520	NA
## 259	b	B	M	GenX	2520	NA
## 260	b	B	M	GenX	2520	NA
## 261	b	B	M	Millenial	2520	NA
## 262	b	B	M	Millenial	2520	NA
## 263	b	B	M	Millenial	2520	NA
## 264	b	B	M	Millenial	2520	NA
## 265	b	B	M	Millenial	2520	NA
## 266	b	B	M	Millenial	2520	NA
## 267	b	B	M	Millenial	2520	NA
## 268	b	B	M	Millenial	2520	NA
## 269	b	B	M	Millenial	2520	NA
## 270	b	B	M	Millenial	2520	NA
## 271	b	B	F	Boomer	2520	NA
## 272	b	B	F	Boomer	2520	NA
## 273	b	B	F	Boomer	2520	NA
## 274	b	B	F	Boomer	2520	NA

## 275	b	B	F	Boomer	2520	NA
## 276	b	B	F	Boomer	2520	NA
## 277	b	B	F	Boomer	2520	NA
## 278	b	B	F	Boomer	2520	NA
## 279	b	B	F	Boomer	2520	NA
## 280	b	B	F	Boomer	2520	NA
## 281	b	B	F	GenX	2520	NA
## 282	b	B	F	GenX	2520	NA
## 283	b	B	F	GenX	2520	NA
## 284	b	B	F	GenX	2520	NA
## 285	b	B	F	GenX	2520	NA
## 286	b	B	F	GenX	2520	NA
## 287	b	B	F	GenX	2520	NA
## 288	b	B	F	GenX	2520	NA
## 289	b	B	F	GenX	2520	NA
## 290	b	B	F	GenX	2520	NA
## 291	b	B	F	Millennial	2520	NA
## 292	b	B	F	Millennial	2520	NA
## 293	b	B	F	Millennial	2520	NA
## 294	b	B	F	Millennial	2520	NA
## 295	b	B	F	Millennial	2520	NA
## 296	b	B	F	Millennial	2520	NA
## 297	b	B	F	Millennial	2520	NA
## 298	b	B	F	Millennial	2520	NA
## 299	b	B	F	Millennial	2520	NA
## 300	b	B	F	Millennial	2520	NA
## 301	b	C	M	Boomer	2520	NA
## 302	b	C	M	Boomer	2520	NA
## 303	b	C	M	Boomer	2520	NA
## 304	b	C	M	Boomer	2520	NA
## 305	b	C	M	Boomer	2520	NA
## 306	b	C	M	Boomer	2520	NA
## 307	b	C	M	Boomer	2520	NA
## 308	b	C	M	Boomer	2520	NA
## 309	b	C	M	Boomer	2520	NA
## 310	b	C	M	Boomer	2520	NA
## 311	b	C	M	GenX	2520	NA
## 312	b	C	M	GenX	2520	NA
## 313	b	C	M	GenX	2520	NA
## 314	b	C	M	GenX	2520	NA
## 315	b	C	M	GenX	2520	NA
## 316	b	C	M	GenX	2520	NA
## 317	b	C	M	GenX	2520	NA
## 318	b	C	M	GenX	2520	NA
## 319	b	C	M	GenX	2520	NA
## 320	b	C	M	GenX	2520	NA
## 321	b	C	M	Millennial	2520	NA
## 322	b	C	M	Millennial	2520	NA
## 323	b	C	M	Millennial	2520	NA
## 324	b	C	M	Millennial	2520	NA
## 325	b	C	M	Millennial	2520	NA
## 326	b	C	M	Millennial	2520	NA
## 327	b	C	M	Millennial	2520	NA
## 328	b	C	M	Millennial	2520	NA

## 329	b	C	M	Millennial	2520	NA
## 330	b	C	M	Millennial	2520	NA
## 331	b	C	F	Boomer	2520	NA
## 332	b	C	F	Boomer	2520	NA
## 333	b	C	F	Boomer	2520	NA
## 334	b	C	F	Boomer	2520	NA
## 335	b	C	F	Boomer	2520	NA
## 336	b	C	F	Boomer	2520	NA
## 337	b	C	F	Boomer	2520	NA
## 338	b	C	F	Boomer	2520	NA
## 339	b	C	F	Boomer	2520	NA
## 340	b	C	F	Boomer	2520	NA
## 341	b	C	F	GenX	2520	NA
## 342	b	C	F	GenX	2520	NA
## 343	b	C	F	GenX	2520	NA
## 344	b	C	F	GenX	2520	NA
## 345	b	C	F	GenX	2520	NA
## 346	b	C	F	GenX	2520	NA
## 347	b	C	F	GenX	2520	NA
## 348	b	C	F	GenX	2520	NA
## 349	b	C	F	GenX	2520	NA
## 350	b	C	F	GenX	2520	NA
## 351	b	C	F	Millennial	2520	NA
## 352	b	C	F	Millennial	2520	NA
## 353	b	C	F	Millennial	2520	NA
## 354	b	C	F	Millennial	2520	NA
## 355	b	C	F	Millennial	2520	NA
## 356	b	C	F	Millennial	2520	NA
## 357	b	C	F	Millennial	2520	NA
## 358	b	C	F	Millennial	2520	NA
## 359	b	C	F	Millennial	2520	NA
## 360	b	C	F	Millennial	2520	NA
## 361	c	A	M	Boomer	2520	NA
## 362	c	A	M	Boomer	2520	NA
## 363	c	A	M	Boomer	2520	NA
## 364	c	A	M	Boomer	2520	NA
## 365	c	A	M	Boomer	2520	NA
## 366	c	A	M	Boomer	2520	NA
## 367	c	A	M	Boomer	2520	NA
## 368	c	A	M	Boomer	2520	NA
## 369	c	A	M	Boomer	2520	NA
## 370	c	A	M	Boomer	2520	NA
## 371	c	A	M	GenX	2520	NA
## 372	c	A	M	GenX	2520	NA
## 373	c	A	M	GenX	2520	NA
## 374	c	A	M	GenX	2520	NA
## 375	c	A	M	GenX	2520	NA
## 376	c	A	M	GenX	2520	NA
## 377	c	A	M	GenX	2520	NA
## 378	c	A	M	GenX	2520	NA
## 379	c	A	M	GenX	2520	NA
## 380	c	A	M	GenX	2520	NA
## 381	c	A	M	Millennial	2520	NA
## 382	c	A	M	Millennial	2520	NA

## 383	c	A	M	Millenial	2520	NA
## 384	c	A	M	Millenial	2520	NA
## 385	c	A	M	Millenial	2520	NA
## 386	c	A	M	Millenial	2520	NA
## 387	c	A	M	Millenial	2520	NA
## 388	c	A	M	Millenial	2520	NA
## 389	c	A	M	Millenial	2520	NA
## 390	c	A	M	Millenial	2520	NA
## 391	c	A	F	Boomer	2520	NA
## 392	c	A	F	Boomer	2520	NA
## 393	c	A	F	Boomer	2520	NA
## 394	c	A	F	Boomer	2520	NA
## 395	c	A	F	Boomer	2520	NA
## 396	c	A	F	Boomer	2520	NA
## 397	c	A	F	Boomer	2520	NA
## 398	c	A	F	Boomer	2520	NA
## 399	c	A	F	Boomer	2520	NA
## 400	c	A	F	Boomer	2520	NA
## 401	c	A	F	GenX	2520	NA
## 402	c	A	F	GenX	2520	NA
## 403	c	A	F	GenX	2520	NA
## 404	c	A	F	GenX	2520	NA
## 405	c	A	F	GenX	2520	NA
## 406	c	A	F	GenX	2520	NA
## 407	c	A	F	GenX	2520	NA
## 408	c	A	F	GenX	2520	NA
## 409	c	A	F	GenX	2520	NA
## 410	c	A	F	GenX	2520	NA
## 411	c	A	F	Millenial	2520	NA
## 412	c	A	F	Millenial	2520	NA
## 413	c	A	F	Millenial	2520	NA
## 414	c	A	F	Millenial	2520	NA
## 415	c	A	F	Millenial	2520	NA
## 416	c	A	F	Millenial	2520	NA
## 417	c	A	F	Millenial	2520	NA
## 418	c	A	F	Millenial	2520	NA
## 419	c	A	F	Millenial	2520	NA
## 420	c	A	F	Millenial	2520	NA
## 421	c	B	M	Boomer	2520	NA
## 422	c	B	M	Boomer	2520	NA
## 423	c	B	M	Boomer	2520	NA
## 424	c	B	M	Boomer	2520	NA
## 425	c	B	M	Boomer	2520	NA
## 426	c	B	M	Boomer	2520	NA
## 427	c	B	M	Boomer	2520	NA
## 428	c	B	M	Boomer	2520	NA
## 429	c	B	M	Boomer	2520	NA
## 430	c	B	M	Boomer	2520	NA
## 431	c	B	M	GenX	2520	NA
## 432	c	B	M	GenX	2520	NA
## 433	c	B	M	GenX	2520	NA
## 434	c	B	M	GenX	2520	NA
## 435	c	B	M	GenX	2520	NA
## 436	c	B	M	GenX	2520	NA

## 437	c	B	M	GenX	2520	NA
## 438	c	B	M	GenX	2520	NA
## 439	c	B	M	GenX	2520	NA
## 440	c	B	M	GenX	2520	NA
## 441	c	B	M	Millenial	2520	NA
## 442	c	B	M	Millenial	2520	NA
## 443	c	B	M	Millenial	2520	NA
## 444	c	B	M	Millenial	2520	NA
## 445	c	B	M	Millenial	2520	NA
## 446	c	B	M	Millenial	2520	NA
## 447	c	B	M	Millenial	2520	NA
## 448	c	B	M	Millenial	2520	NA
## 449	c	B	M	Millenial	2520	NA
## 450	c	B	M	Millenial	2520	NA
## 451	c	B	F	Boomer	2520	NA
## 452	c	B	F	Boomer	2520	NA
## 453	c	B	F	Boomer	2520	NA
## 454	c	B	F	Boomer	2520	NA
## 455	c	B	F	Boomer	2520	NA
## 456	c	B	F	Boomer	2520	NA
## 457	c	B	F	Boomer	2520	NA
## 458	c	B	F	Boomer	2520	NA
## 459	c	B	F	Boomer	2520	NA
## 460	c	B	F	Boomer	2520	NA
## 461	c	B	F	GenX	2520	NA
## 462	c	B	F	GenX	2520	NA
## 463	c	B	F	GenX	2520	NA
## 464	c	B	F	GenX	2520	NA
## 465	c	B	F	GenX	2520	NA
## 466	c	B	F	GenX	2520	NA
## 467	c	B	F	GenX	2520	NA
## 468	c	B	F	GenX	2520	NA
## 469	c	B	F	GenX	2520	NA
## 470	c	B	F	GenX	2520	NA
## 471	c	B	F	Millenial	2520	NA
## 472	c	B	F	Millenial	2520	NA
## 473	c	B	F	Millenial	2520	NA
## 474	c	B	F	Millenial	2520	NA
## 475	c	B	F	Millenial	2520	NA
## 476	c	B	F	Millenial	2520	NA
## 477	c	B	F	Millenial	2520	NA
## 478	c	B	F	Millenial	2520	NA
## 479	c	B	F	Millenial	2520	NA
## 480	c	B	F	Millenial	2520	NA
## 481	c	C	M	Boomer	2520	NA
## 482	c	C	M	Boomer	2520	NA
## 483	c	C	M	Boomer	2520	NA
## 484	c	C	M	Boomer	2520	NA
## 485	c	C	M	Boomer	2520	NA
## 486	c	C	M	Boomer	2520	NA
## 487	c	C	M	Boomer	2520	NA
## 488	c	C	M	Boomer	2520	NA
## 489	c	C	M	Boomer	2520	NA
## 490	c	C	M	Boomer	2520	NA

## 491	c	C	M	GenX	2520	NA
## 492	c	C	M	GenX	2520	NA
## 493	c	C	M	GenX	2520	NA
## 494	c	C	M	GenX	2520	NA
## 495	c	C	M	GenX	2520	NA
## 496	c	C	M	GenX	2520	NA
## 497	c	C	M	GenX	2520	NA
## 498	c	C	M	GenX	2520	NA
## 499	c	C	M	GenX	2520	NA
## 500	c	C	M	GenX	2520	NA
## 501	c	C	M	Millennial	2520	NA
## 502	c	C	M	Millennial	2520	NA
## 503	c	C	M	Millennial	2520	NA
## 504	c	C	M	Millennial	2520	NA
## 505	c	C	M	Millennial	2520	NA
## 506	c	C	M	Millennial	2520	NA
## 507	c	C	M	Millennial	2520	NA
## 508	c	C	M	Millennial	2520	NA
## 509	c	C	M	Millennial	2520	NA
## 510	c	C	M	Millennial	2520	NA
## 511	c	C	F	Boomer	2520	NA
## 512	c	C	F	Boomer	2520	NA
## 513	c	C	F	Boomer	2520	NA
## 514	c	C	F	Boomer	2520	NA
## 515	c	C	F	Boomer	2520	NA
## 516	c	C	F	Boomer	2520	NA
## 517	c	C	F	Boomer	2520	NA
## 518	c	C	F	Boomer	2520	NA
## 519	c	C	F	Boomer	2520	NA
## 520	c	C	F	Boomer	2520	NA
## 521	c	C	F	GenX	2520	NA
## 522	c	C	F	GenX	2520	NA
## 523	c	C	F	GenX	2520	NA
## 524	c	C	F	GenX	2520	NA
## 525	c	C	F	GenX	2520	NA
## 526	c	C	F	GenX	2520	NA
## 527	c	C	F	GenX	2520	NA
## 528	c	C	F	GenX	2520	NA
## 529	c	C	F	GenX	2520	NA
## 530	c	C	F	GenX	2520	NA
## 531	c	C	F	Millennial	2520	NA
## 532	c	C	F	Millennial	2520	NA
## 533	c	C	F	Millennial	2520	NA
## 534	c	C	F	Millennial	2520	NA
## 535	c	C	F	Millennial	2520	NA
## 536	c	C	F	Millennial	2520	NA
## 537	c	C	F	Millennial	2520	NA
## 538	c	C	F	Millennial	2520	NA
## 539	c	C	F	Millennial	2520	NA
## 540	c	C	F	Millennial	2520	NA
## 541	d	A	M	Boomer	2520	NA
## 542	d	A	M	Boomer	2520	NA
## 543	d	A	M	Boomer	2520	NA
## 544	d	A	M	Boomer	2520	NA

## 545	d	A	M	Boomer	2520	NA
## 546	d	A	M	Boomer	2520	NA
## 547	d	A	M	Boomer	2520	NA
## 548	d	A	M	Boomer	2520	NA
## 549	d	A	M	Boomer	2520	NA
## 550	d	A	M	Boomer	2520	NA
## 551	d	A	M	GenX	2520	NA
## 552	d	A	M	GenX	2520	NA
## 553	d	A	M	GenX	2520	NA
## 554	d	A	M	GenX	2520	NA
## 555	d	A	M	GenX	2520	NA
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## 559	d	A	M	GenX	2520	NA
## 560	d	A	M	GenX	2520	NA
## 561	d	A	M	Millennial	2520	NA
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## 563	d	A	M	Millennial	2520	NA
## 564	d	A	M	Millennial	2520	NA
## 565	d	A	M	Millennial	2520	NA
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## 570	d	A	M	Millennial	2520	NA
## 571	d	A	F	Boomer	2520	NA
## 572	d	A	F	Boomer	2520	NA
## 573	d	A	F	Boomer	2520	NA
## 574	d	A	F	Boomer	2520	NA
## 575	d	A	F	Boomer	2520	NA
## 576	d	A	F	Boomer	2520	NA
## 577	d	A	F	Boomer	2520	NA
## 578	d	A	F	Boomer	2520	NA
## 579	d	A	F	Boomer	2520	NA
## 580	d	A	F	Boomer	2520	NA
## 581	d	A	F	GenX	2520	NA
## 582	d	A	F	GenX	2520	NA
## 583	d	A	F	GenX	2520	NA
## 584	d	A	F	GenX	2520	NA
## 585	d	A	F	GenX	2520	NA
## 586	d	A	F	GenX	2520	NA
## 587	d	A	F	GenX	2520	NA
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## 589	d	A	F	GenX	2520	NA
## 590	d	A	F	GenX	2520	NA
## 591	d	A	F	Millennial	2520	NA
## 592	d	A	F	Millennial	2520	NA
## 593	d	A	F	Millennial	2520	NA
## 594	d	A	F	Millennial	2520	NA
## 595	d	A	F	Millennial	2520	NA
## 596	d	A	F	Millennial	2520	NA
## 597	d	A	F	Millennial	2520	NA
## 598	d	A	F	Millennial	2520	NA

## 599	d	A	F	Millenial	2520	NA
## 600	d	A	F	Millenial	2520	NA
## 601	d	B	M	Boomer	2520	NA
## 602	d	B	M	Boomer	2520	NA
## 603	d	B	M	Boomer	2520	NA
## 604	d	B	M	Boomer	2520	NA
## 605	d	B	M	Boomer	2520	NA
## 606	d	B	M	Boomer	2520	NA
## 607	d	B	M	Boomer	2520	NA
## 608	d	B	M	Boomer	2520	NA
## 609	d	B	M	Boomer	2520	NA
## 610	d	B	M	Boomer	2520	NA
## 611	d	B	M	GenX	2520	NA
## 612	d	B	M	GenX	2520	NA
## 613	d	B	M	GenX	2520	NA
## 614	d	B	M	GenX	2520	NA
## 615	d	B	M	GenX	2520	NA
## 616	d	B	M	GenX	2520	NA
## 617	d	B	M	GenX	2520	NA
## 618	d	B	M	GenX	2520	NA
## 619	d	B	M	GenX	2520	NA
## 620	d	B	M	GenX	2520	NA
## 621	d	B	M	Millenial	2520	NA
## 622	d	B	M	Millenial	2520	NA
## 623	d	B	M	Millenial	2520	NA
## 624	d	B	M	Millenial	2520	NA
## 625	d	B	M	Millenial	2520	NA
## 626	d	B	M	Millenial	2520	NA
## 627	d	B	M	Millenial	2520	NA
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## 631	d	B	F	Boomer	2520	NA
## 632	d	B	F	Boomer	2520	NA
## 633	d	B	F	Boomer	2520	NA
## 634	d	B	F	Boomer	2520	NA
## 635	d	B	F	Boomer	2520	NA
## 636	d	B	F	Boomer	2520	NA
## 637	d	B	F	Boomer	2520	NA
## 638	d	B	F	Boomer	2520	NA
## 639	d	B	F	Boomer	2520	NA
## 640	d	B	F	Boomer	2520	NA
## 641	d	B	F	GenX	2520	NA
## 642	d	B	F	GenX	2520	NA
## 643	d	B	F	GenX	2520	NA
## 644	d	B	F	GenX	2520	NA
## 645	d	B	F	GenX	2520	NA
## 646	d	B	F	GenX	2520	NA
## 647	d	B	F	GenX	2520	NA
## 648	d	B	F	GenX	2520	NA
## 649	d	B	F	GenX	2520	NA
## 650	d	B	F	GenX	2520	NA
## 651	d	B	F	Millenial	2520	NA
## 652	d	B	F	Millenial	2520	NA



## 653	d	B	F	Millenial	2520	NA
## 654	d	B	F	Millenial	2520	NA
## 655	d	B	F	Millenial	2520	NA
## 656	d	B	F	Millenial	2520	NA
## 657	d	B	F	Millenial	2520	NA
## 658	d	B	F	Millenial	2520	NA
## 659	d	B	F	Millenial	2520	NA
## 660	d	B	F	Millenial	2520	NA
## 661	d	C	M	Boomer	2520	NA
## 662	d	C	M	Boomer	2520	NA
## 663	d	C	M	Boomer	2520	NA
## 664	d	C	M	Boomer	2520	NA
## 665	d	C	M	Boomer	2520	NA
## 666	d	C	M	Boomer	2520	NA
## 667	d	C	M	Boomer	2520	NA
## 668	d	C	M	Boomer	2520	NA
## 669	d	C	M	Boomer	2520	NA
## 670	d	C	M	Boomer	2520	NA
## 671	d	C	M	GenX	2520	NA
## 672	d	C	M	GenX	2520	NA
## 673	d	C	M	GenX	2520	NA
## 674	d	C	M	GenX	2520	NA
## 675	d	C	M	GenX	2520	NA
## 676	d	C	M	GenX	2520	NA
## 677	d	C	M	GenX	2520	NA
## 678	d	C	M	GenX	2520	NA
## 679	d	C	M	GenX	2520	NA
## 680	d	C	M	GenX	2520	NA
## 681	d	C	M	Millenial	2520	NA
## 682	d	C	M	Millenial	2520	NA
## 683	d	C	M	Millenial	2520	NA
## 684	d	C	M	Millenial	2520	NA
## 685	d	C	M	Millenial	2520	NA
## 686	d	C	M	Millenial	2520	NA
## 687	d	C	M	Millenial	2520	NA
## 688	d	C	M	Millenial	2520	NA
## 689	d	C	M	Millenial	2520	NA
## 690	d	C	M	Millenial	2520	NA
## 691	d	C	F	Boomer	2520	NA
## 692	d	C	F	Boomer	2520	NA
## 693	d	C	F	Boomer	2520	NA
## 694	d	C	F	Boomer	2520	NA
## 695	d	C	F	Boomer	2520	NA
## 696	d	C	F	Boomer	2520	NA
## 697	d	C	F	Boomer	2520	NA
## 698	d	C	F	Boomer	2520	NA
## 699	d	C	F	Boomer	2520	NA
## 700	d	C	F	Boomer	2520	NA
## 701	d	C	F	GenX	2520	NA
## 702	d	C	F	GenX	2520	NA
## 703	d	C	F	GenX	2520	NA
## 704	d	C	F	GenX	2520	NA
## 705	d	C	F	GenX	2520	NA
## 706	d	C	F	GenX	2520	NA

## 707	d	C	F	GenX	2520	NA
## 708	d	C	F	GenX	2520	NA
## 709	d	C	F	GenX	2520	NA
## 710	d	C	F	GenX	2520	NA
## 711	d	C	F	Millennial	2520	NA
## 712	d	C	F	Millennial	2520	NA
## 713	d	C	F	Millennial	2520	NA
## 714	d	C	F	Millennial	2520	NA
## 715	d	C	F	Millennial	2520	NA
## 716	d	C	F	Millennial	2520	NA
## 717	d	C	F	Millennial	2520	NA
## 718	d	C	F	Millennial	2520	NA
## 719	d	C	F	Millennial	2520	NA
## 720	d	C	F	Millennial	2520	NA
## 721	e	A	M	Boomer	2520	NA
## 722	e	A	M	Boomer	2520	NA
## 723	e	A	M	Boomer	2520	NA
## 724	e	A	M	Boomer	2520	NA
## 725	e	A	M	Boomer	2520	NA
## 726	e	A	M	Boomer	2520	NA
## 727	e	A	M	Boomer	2520	NA
## 728	e	A	M	Boomer	2520	NA
## 729	e	A	M	Boomer	2520	NA
## 730	e	A	M	Boomer	2520	NA
## 731	e	A	M	GenX	2520	NA
## 732	e	A	M	GenX	2520	NA
## 733	e	A	M	GenX	2520	NA
## 734	e	A	M	GenX	2520	NA
## 735	e	A	M	GenX	2520	NA
## 736	e	A	M	GenX	2520	NA
## 737	e	A	M	GenX	2520	NA
## 738	e	A	M	GenX	2520	NA
## 739	e	A	M	GenX	2520	NA
## 740	e	A	M	GenX	2520	NA
## 741	e	A	M	Millennial	2520	NA
## 742	e	A	M	Millennial	2520	NA
## 743	e	A	M	Millennial	2520	NA
## 744	e	A	M	Millennial	2520	NA
## 745	e	A	M	Millennial	2520	NA
## 746	e	A	M	Millennial	2520	NA
## 747	e	A	M	Millennial	2520	NA
## 748	e	A	M	Millennial	2520	NA
## 749	e	A	M	Millennial	2520	NA
## 750	e	A	M	Millennial	2520	NA
## 751	e	A	F	Boomer	2520	NA
## 752	e	A	F	Boomer	2520	NA
## 753	e	A	F	Boomer	2520	NA
## 754	e	A	F	Boomer	2520	NA
## 755	e	A	F	Boomer	2520	NA
## 756	e	A	F	Boomer	2520	NA
## 757	e	A	F	Boomer	2520	NA
## 758	e	A	F	Boomer	2520	NA
## 759	e	A	F	Boomer	2520	NA
## 760	e	A	F	Boomer	2520	NA

## 761	e	A	F	GenX	2520	NA
## 762	e	A	F	GenX	2520	NA
## 763	e	A	F	GenX	2520	NA
## 764	e	A	F	GenX	2520	NA
## 765	e	A	F	GenX	2520	NA
## 766	e	A	F	GenX	2520	NA
## 767	e	A	F	GenX	2520	NA
## 768	e	A	F	GenX	2520	NA
## 769	e	A	F	GenX	2520	NA
## 770	e	A	F	GenX	2520	NA
## 771	e	A	F	Millenial	2520	NA
## 772	e	A	F	Millenial	2520	NA
## 773	e	A	F	Millenial	2520	NA
## 774	e	A	F	Millenial	2520	NA
## 775	e	A	F	Millenial	2520	NA
## 776	e	A	F	Millenial	2520	NA
## 777	e	A	F	Millenial	2520	NA
## 778	e	A	F	Millenial	2520	NA
## 779	e	A	F	Millenial	2520	NA
## 780	e	A	F	Millenial	2520	NA
## 781	e	B	M	Boomer	2520	NA
## 782	e	B	M	Boomer	2520	NA
## 783	e	B	M	Boomer	2520	NA
## 784	e	B	M	Boomer	2520	NA
## 785	e	B	M	Boomer	2520	NA
## 786	e	B	M	Boomer	2520	NA
## 787	e	B	M	Boomer	2520	NA
## 788	e	B	M	Boomer	2520	NA
## 789	e	B	M	Boomer	2520	NA
## 790	e	B	M	Boomer	2520	NA
## 791	e	B	M	GenX	2520	NA
## 792	e	B	M	GenX	2520	NA
## 793	e	B	M	GenX	2520	NA
## 794	e	B	M	GenX	2520	NA
## 795	e	B	M	GenX	2520	NA
## 796	e	B	M	GenX	2520	NA
## 797	e	B	M	GenX	2520	NA
## 798	e	B	M	GenX	2520	NA
## 799	e	B	M	GenX	2520	NA
## 800	e	B	M	GenX	2520	NA
## 801	e	B	M	Millenial	2520	NA
## 802	e	B	M	Millenial	2520	NA
## 803	e	B	M	Millenial	2520	NA
## 804	e	B	M	Millenial	2520	NA
## 805	e	B	M	Millenial	2520	NA
## 806	e	B	M	Millenial	2520	NA
## 807	e	B	M	Millenial	2520	NA
## 808	e	B	M	Millenial	2520	NA
## 809	e	B	M	Millenial	2520	NA
## 810	e	B	M	Millenial	2520	NA
## 811	e	B	F	Boomer	2520	NA
## 812	e	B	F	Boomer	2520	NA
## 813	e	B	F	Boomer	2520	NA
## 814	e	B	F	Boomer	2520	NA

## 815	e	B	F	Boomer	2520	NA
## 816	e	B	F	Boomer	2520	NA
## 817	e	B	F	Boomer	2520	NA
## 818	e	B	F	Boomer	2520	NA
## 819	e	B	F	Boomer	2520	NA
## 820	e	B	F	Boomer	2520	NA
## 821	e	B	F	GenX	2520	NA
## 822	e	B	F	GenX	2520	NA
## 823	e	B	F	GenX	2520	NA
## 824	e	B	F	GenX	2520	NA
## 825	e	B	F	GenX	2520	NA
## 826	e	B	F	GenX	2520	NA
## 827	e	B	F	GenX	2520	NA
## 828	e	B	F	GenX	2520	NA
## 829	e	B	F	GenX	2520	NA
## 830	e	B	F	GenX	2520	NA
## 831	e	B	F	Millenial	2520	NA
## 832	e	B	F	Millenial	2520	NA
## 833	e	B	F	Millenial	2520	NA
## 834	e	B	F	Millenial	2520	NA
## 835	e	B	F	Millenial	2520	NA
## 836	e	B	F	Millenial	2520	NA
## 837	e	B	F	Millenial	2520	NA
## 838	e	B	F	Millenial	2520	NA
## 839	e	B	F	Millenial	2520	NA
## 840	e	B	F	Millenial	2520	NA
## 841	e	C	M	Boomer	2520	NA
## 842	e	C	M	Boomer	2520	NA
## 843	e	C	M	Boomer	2520	NA
## 844	e	C	M	Boomer	2520	NA
## 845	e	C	M	Boomer	2520	NA
## 846	e	C	M	Boomer	2520	NA
## 847	e	C	M	Boomer	2520	NA
## 848	e	C	M	Boomer	2520	NA
## 849	e	C	M	Boomer	2520	NA
## 850	e	C	M	Boomer	2520	NA
## 851	e	C	M	GenX	2520	NA
## 852	e	C	M	GenX	2520	NA
## 853	e	C	M	GenX	2520	NA
## 854	e	C	M	GenX	2520	NA
## 855	e	C	M	GenX	2520	NA
## 856	e	C	M	GenX	2520	NA
## 857	e	C	M	GenX	2520	NA
## 858	e	C	M	GenX	2520	NA
## 859	e	C	M	GenX	2520	NA
## 860	e	C	M	GenX	2520	NA
## 861	e	C	M	Millenial	2520	NA
## 862	e	C	M	Millenial	2520	NA
## 863	e	C	M	Millenial	2520	NA
## 864	e	C	M	Millenial	2520	NA
## 865	e	C	M	Millenial	2520	NA
## 866	e	C	M	Millenial	2520	NA
## 867	e	C	M	Millenial	2520	NA
## 868	e	C	M	Millenial	2520	NA

## 869	e	C	M	Millennial	2520	NA
## 870	e	C	M	Millennial	2520	NA
## 871	e	C	F	Boomer	2520	NA
## 872	e	C	F	Boomer	2520	NA
## 873	e	C	F	Boomer	2520	NA
## 874	e	C	F	Boomer	2520	NA
## 875	e	C	F	Boomer	2520	NA
## 876	e	C	F	Boomer	2520	NA
## 877	e	C	F	Boomer	2520	NA
## 878	e	C	F	Boomer	2520	NA
## 879	e	C	F	Boomer	2520	NA
## 880	e	C	F	Boomer	2520	NA
## 881	e	C	F	GenX	2520	NA
## 882	e	C	F	GenX	2520	NA
## 883	e	C	F	GenX	2520	NA
## 884	e	C	F	GenX	2520	NA
## 885	e	C	F	GenX	2520	NA
## 886	e	C	F	GenX	2520	NA
## 887	e	C	F	GenX	2520	NA
## 888	e	C	F	GenX	2520	NA
## 889	e	C	F	GenX	2520	NA
## 890	e	C	F	GenX	2520	NA
## 891	e	C	F	Millennial	2520	NA
## 892	e	C	F	Millennial	2520	NA
## 893	e	C	F	Millennial	2520	NA
## 894	e	C	F	Millennial	2520	NA
## 895	e	C	F	Millennial	2520	NA
## 896	e	C	F	Millennial	2520	NA
## 897	e	C	F	Millennial	2520	NA
## 898	e	C	F	Millennial	2520	NA
## 899	e	C	F	Millennial	2520	NA
## 900	e	C	F	Millennial	2520	NA
## 901	f	A	M	Boomer	2520	NA
## 902	f	A	M	Boomer	2520	NA
## 903	f	A	M	Boomer	2520	NA
## 904	f	A	M	Boomer	2520	NA
## 905	f	A	M	Boomer	2520	NA
## 906	f	A	M	Boomer	2520	NA
## 907	f	A	M	Boomer	2520	NA
## 908	f	A	M	Boomer	2520	NA
## 909	f	A	M	Boomer	2520	NA
## 910	f	A	M	Boomer	2520	NA
## 911	f	A	M	GenX	2520	NA
## 912	f	A	M	GenX	2520	NA
## 913	f	A	M	GenX	2520	NA
## 914	f	A	M	GenX	2520	NA
## 915	f	A	M	GenX	2520	NA
## 916	f	A	M	GenX	2520	NA
## 917	f	A	M	GenX	2520	NA
## 918	f	A	M	GenX	2520	NA
## 919	f	A	M	GenX	2520	NA
## 920	f	A	M	GenX	2520	NA
## 921	f	A	M	Millennial	2520	NA
## 922	f	A	M	Millennial	2520	NA

## 923	f	A	M	Millenial	2520	NA
## 924	f	A	M	Millenial	2520	NA
## 925	f	A	M	Millenial	2520	NA
## 926	f	A	M	Millenial	2520	NA
## 927	f	A	M	Millenial	2520	NA
## 928	f	A	M	Millenial	2520	NA
## 929	f	A	M	Millenial	2520	NA
## 930	f	A	M	Millenial	2520	NA
## 931	f	A	F	Boomer	2520	NA
## 932	f	A	F	Boomer	2520	NA
## 933	f	A	F	Boomer	2520	NA
## 934	f	A	F	Boomer	2520	NA
## 935	f	A	F	Boomer	2520	NA
## 936	f	A	F	Boomer	2520	NA
## 937	f	A	F	Boomer	2520	NA
## 938	f	A	F	Boomer	2520	NA
## 939	f	A	F	Boomer	2520	NA
## 940	f	A	F	Boomer	2520	NA
## 941	f	A	F	GenX	2520	NA
## 942	f	A	F	GenX	2520	NA
## 943	f	A	F	GenX	2520	NA
## 944	f	A	F	GenX	2520	NA
## 945	f	A	F	GenX	2520	NA
## 946	f	A	F	GenX	2520	NA
## 947	f	A	F	GenX	2520	NA
## 948	f	A	F	GenX	2520	NA
## 949	f	A	F	GenX	2520	NA
## 950	f	A	F	GenX	2520	NA
## 951	f	A	F	Millenial	2520	NA
## 952	f	A	F	Millenial	2520	NA
## 953	f	A	F	Millenial	2520	NA
## 954	f	A	F	Millenial	2520	NA
## 955	f	A	F	Millenial	2520	NA
## 956	f	A	F	Millenial	2520	NA
## 957	f	A	F	Millenial	2520	NA
## 958	f	A	F	Millenial	2520	NA
## 959	f	A	F	Millenial	2520	NA
## 960	f	A	F	Millenial	2520	NA
## 961	f	B	M	Boomer	2520	NA
## 962	f	B	M	Boomer	2520	NA
## 963	f	B	M	Boomer	2520	NA
## 964	f	B	M	Boomer	2520	NA
## 965	f	B	M	Boomer	2520	NA
## 966	f	B	M	Boomer	2520	NA
## 967	f	B	M	Boomer	2520	NA
## 968	f	B	M	Boomer	2520	NA
## 969	f	B	M	Boomer	2520	NA
## 970	f	B	M	Boomer	2520	NA
## 971	f	B	M	GenX	2520	NA
## 972	f	B	M	GenX	2520	NA
## 973	f	B	M	GenX	2520	NA
## 974	f	B	M	GenX	2520	NA
## 975	f	B	M	GenX	2520	NA
## 976	f	B	M	GenX	2520	NA

## 977	f	B	M	GenX	2520	NA
## 978	f	B	M	GenX	2520	NA
## 979	f	B	M	GenX	2520	NA
## 980	f	B	M	GenX	2520	NA
## 981	f	B	M	Millennial	2520	NA
## 982	f	B	M	Millennial	2520	NA
## 983	f	B	M	Millennial	2520	NA
## 984	f	B	M	Millennial	2520	NA
## 985	f	B	M	Millennial	2520	NA
## 986	f	B	M	Millennial	2520	NA
## 987	f	B	M	Millennial	2520	NA
## 988	f	B	M	Millennial	2520	NA
## 989	f	B	M	Millennial	2520	NA
## 990	f	B	M	Millennial	2520	NA
## 991	f	B	F	Boomer	2520	NA
## 992	f	B	F	Boomer	2520	NA
## 993	f	B	F	Boomer	2520	NA
## 994	f	B	F	Boomer	2520	NA
## 995	f	B	F	Boomer	2520	NA
## 996	f	B	F	Boomer	2520	NA
## 997	f	B	F	Boomer	2520	NA
## 998	f	B	F	Boomer	2520	NA
## 999	f	B	F	Boomer	2520	NA
## 1000	f	B	F	Boomer	2520	NA
## 1001	f	B	F	GenX	2520	NA
## 1002	f	B	F	GenX	2520	NA
## 1003	f	B	F	GenX	2520	NA
## 1004	f	B	F	GenX	2520	NA
## 1005	f	B	F	GenX	2520	NA
## 1006	f	B	F	GenX	2520	NA
## 1007	f	B	F	GenX	2520	NA
## 1008	f	B	F	GenX	2520	NA
## 1009	f	B	F	GenX	2520	NA
## 1010	f	B	F	GenX	2520	NA
## 1011	f	B	F	Millennial	2520	NA
## 1012	f	B	F	Millennial	2520	NA
## 1013	f	B	F	Millennial	2520	NA
## 1014	f	B	F	Millennial	2520	NA
## 1015	f	B	F	Millennial	2520	NA
## 1016	f	B	F	Millennial	2520	NA
## 1017	f	B	F	Millennial	2520	NA
## 1018	f	B	F	Millennial	2520	NA
## 1019	f	B	F	Millennial	2520	NA
## 1020	f	B	F	Millennial	2520	NA
## 1021	f	C	M	Boomer	2520	NA
## 1022	f	C	M	Boomer	2520	NA
## 1023	f	C	M	Boomer	2520	NA
## 1024	f	C	M	Boomer	2520	NA
## 1025	f	C	M	Boomer	2520	NA
## 1026	f	C	M	Boomer	2520	NA
## 1027	f	C	M	Boomer	2520	NA
## 1028	f	C	M	Boomer	2520	NA
## 1029	f	C	M	Boomer	2520	NA
## 1030	f	C	M	Boomer	2520	NA

## 1031	f	C	M	GenX	2520	NA
## 1032	f	C	M	GenX	2520	NA
## 1033	f	C	M	GenX	2520	NA
## 1034	f	C	M	GenX	2520	NA
## 1035	f	C	M	GenX	2520	NA
## 1036	f	C	M	GenX	2520	NA
## 1037	f	C	M	GenX	2520	NA
## 1038	f	C	M	GenX	2520	NA
## 1039	f	C	M	GenX	2520	NA
## 1040	f	C	M	GenX	2520	NA
## 1041	f	C	M	Millenial	2520	NA
## 1042	f	C	M	Millenial	2520	NA
## 1043	f	C	M	Millenial	2520	NA
## 1044	f	C	M	Millenial	2520	NA
## 1045	f	C	M	Millenial	2520	NA
## 1046	f	C	M	Millenial	2520	NA
## 1047	f	C	M	Millenial	2520	NA
## 1048	f	C	M	Millenial	2520	NA
## 1049	f	C	M	Millenial	2520	NA
## 1050	f	C	M	Millenial	2520	NA
## 1051	f	C	F	Boomer	2520	NA
## 1052	f	C	F	Boomer	2520	NA
## 1053	f	C	F	Boomer	2520	NA
## 1054	f	C	F	Boomer	2520	NA
## 1055	f	C	F	Boomer	2520	NA
## 1056	f	C	F	Boomer	2520	NA
## 1057	f	C	F	Boomer	2520	NA
## 1058	f	C	F	Boomer	2520	NA
## 1059	f	C	F	Boomer	2520	NA
## 1060	f	C	F	Boomer	2520	NA
## 1061	f	C	F	GenX	2520	NA
## 1062	f	C	F	GenX	2520	NA
## 1063	f	C	F	GenX	2520	NA
## 1064	f	C	F	GenX	2520	NA
## 1065	f	C	F	GenX	2520	NA
## 1066	f	C	F	GenX	2520	NA
## 1067	f	C	F	GenX	2520	NA
## 1068	f	C	F	GenX	2520	NA
## 1069	f	C	F	GenX	2520	NA
## 1070	f	C	F	GenX	2520	NA
## 1071	f	C	F	Millenial	2520	NA
## 1072	f	C	F	Millenial	2520	NA
## 1073	f	C	F	Millenial	2520	NA
## 1074	f	C	F	Millenial	2520	NA
## 1075	f	C	F	Millenial	2520	NA
## 1076	f	C	F	Millenial	2520	NA
## 1077	f	C	F	Millenial	2520	NA
## 1078	f	C	F	Millenial	2520	NA
## 1079	f	C	F	Millenial	2520	NA
## 1080	f	C	F	Millenial	2520	NA
## 1081	g	A	M	Boomer	2520	NA
## 1082	g	A	M	Boomer	2520	NA
## 1083	g	A	M	Boomer	2520	NA
## 1084	g	A	M	Boomer	2520	NA



## 1085	g	A	M	Boomer	2520	NA
## 1086	g	A	M	Boomer	2520	NA
## 1087	g	A	M	Boomer	2520	NA
## 1088	g	A	M	Boomer	2520	NA
## 1089	g	A	M	Boomer	2520	NA
## 1090	g	A	M	Boomer	2520	NA
## 1091	g	A	M	GenX	2520	NA
## 1092	g	A	M	GenX	2520	NA
## 1093	g	A	M	GenX	2520	NA
## 1094	g	A	M	GenX	2520	NA
## 1095	g	A	M	GenX	2520	NA
## 1096	g	A	M	GenX	2520	NA
## 1097	g	A	M	GenX	2520	NA
## 1098	g	A	M	GenX	2520	NA
## 1099	g	A	M	GenX	2520	NA
## 1100	g	A	M	GenX	2520	NA
## 1101	g	A	M	Millennial	2520	NA
## 1102	g	A	M	Millennial	2520	NA
## 1103	g	A	M	Millennial	2520	NA
## 1104	g	A	M	Millennial	2520	NA
## 1105	g	A	M	Millennial	2520	NA
## 1106	g	A	M	Millennial	2520	NA
## 1107	g	A	M	Millennial	2520	NA
## 1108	g	A	M	Millennial	2520	NA
## 1109	g	A	M	Millennial	2520	NA
## 1110	g	A	M	Millennial	2520	NA
## 1111	g	A	F	Boomer	2520	NA
## 1112	g	A	F	Boomer	2520	NA
## 1113	g	A	F	Boomer	2520	NA
## 1114	g	A	F	Boomer	2520	NA
## 1115	g	A	F	Boomer	2520	NA
## 1116	g	A	F	Boomer	2520	NA
## 1117	g	A	F	Boomer	2520	NA
## 1118	g	A	F	Boomer	2520	NA
## 1119	g	A	F	Boomer	2520	NA
## 1120	g	A	F	Boomer	2520	NA
## 1121	g	A	F	GenX	2520	NA
## 1122	g	A	F	GenX	2520	NA
## 1123	g	A	F	GenX	2520	NA
## 1124	g	A	F	GenX	2520	NA
## 1125	g	A	F	GenX	2520	NA
## 1126	g	A	F	GenX	2520	NA
## 1127	g	A	F	GenX	2520	NA
## 1128	g	A	F	GenX	2520	NA
## 1129	g	A	F	GenX	2520	NA
## 1130	g	A	F	GenX	2520	NA
## 1131	g	A	F	Millennial	2520	NA
## 1132	g	A	F	Millennial	2520	NA
## 1133	g	A	F	Millennial	2520	NA
## 1134	g	A	F	Millennial	2520	NA
## 1135	g	A	F	Millennial	2520	NA
## 1136	g	A	F	Millennial	2520	NA
## 1137	g	A	F	Millennial	2520	NA
## 1138	g	A	F	Millennial	2520	NA

## 1139	g	A	F	Millenial	2520	NA
## 1140	g	A	F	Millenial	2520	NA
## 1141	g	B	M	Boomer	2520	NA
## 1142	g	B	M	Boomer	2520	NA
## 1143	g	B	M	Boomer	2520	NA
## 1144	g	B	M	Boomer	2520	NA
## 1145	g	B	M	Boomer	2520	NA
## 1146	g	B	M	Boomer	2520	NA
## 1147	g	B	M	Boomer	2520	NA
## 1148	g	B	M	Boomer	2520	NA
## 1149	g	B	M	Boomer	2520	NA
## 1150	g	B	M	Boomer	2520	NA
## 1151	g	B	M	GenX	2520	NA
## 1152	g	B	M	GenX	2520	NA
## 1153	g	B	M	GenX	2520	NA
## 1154	g	B	M	GenX	2520	NA
## 1155	g	B	M	GenX	2520	NA
## 1156	g	B	M	GenX	2520	NA
## 1157	g	B	M	GenX	2520	NA
## 1158	g	B	M	GenX	2520	NA
## 1159	g	B	M	GenX	2520	NA
## 1160	g	B	M	GenX	2520	NA
## 1161	g	B	M	Millenial	2520	NA
## 1162	g	B	M	Millenial	2520	NA
## 1163	g	B	M	Millenial	2520	NA
## 1164	g	B	M	Millenial	2520	NA
## 1165	g	B	M	Millenial	2520	NA
## 1166	g	B	M	Millenial	2520	NA
## 1167	g	B	M	Millenial	2520	NA
## 1168	g	B	M	Millenial	2520	NA
## 1169	g	B	M	Millenial	2520	NA
## 1170	g	B	M	Millenial	2520	NA
## 1171	g	B	F	Boomer	2520	NA
## 1172	g	B	F	Boomer	2520	NA
## 1173	g	B	F	Boomer	2520	NA
## 1174	g	B	F	Boomer	2520	NA
## 1175	g	B	F	Boomer	2520	NA
## 1176	g	B	F	Boomer	2520	NA
## 1177	g	B	F	Boomer	2520	NA
## 1178	g	B	F	Boomer	2520	NA
## 1179	g	B	F	Boomer	2520	NA
## 1180	g	B	F	Boomer	2520	NA
## 1181	g	B	F	GenX	2520	NA
## 1182	g	B	F	GenX	2520	NA
## 1183	g	B	F	GenX	2520	NA
## 1184	g	B	F	GenX	2520	NA
## 1185	g	B	F	GenX	2520	NA
## 1186	g	B	F	GenX	2520	NA
## 1187	g	B	F	GenX	2520	NA
## 1188	g	B	F	GenX	2520	NA
## 1189	g	B	F	GenX	2520	NA
## 1190	g	B	F	GenX	2520	NA
## 1191	g	B	F	Millenial	2520	NA
## 1192	g	B	F	Millenial	2520	NA

## 1193	g	B	F	Millenial	2520	NA
## 1194	g	B	F	Millenial	2520	NA
## 1195	g	B	F	Millenial	2520	NA
## 1196	g	B	F	Millenial	2520	NA
## 1197	g	B	F	Millenial	2520	NA
## 1198	g	B	F	Millenial	2520	NA
## 1199	g	B	F	Millenial	2520	NA
## 1200	g	B	F	Millenial	2520	NA
## 1201	g	C	M	Boomer	2520	NA
## 1202	g	C	M	Boomer	2520	NA
## 1203	g	C	M	Boomer	2520	NA
## 1204	g	C	M	Boomer	2520	NA
## 1205	g	C	M	Boomer	2520	NA
## 1206	g	C	M	Boomer	2520	NA
## 1207	g	C	M	Boomer	2520	NA
## 1208	g	C	M	Boomer	2520	NA
## 1209	g	C	M	Boomer	2520	NA
## 1210	g	C	M	Boomer	2520	NA
## 1211	g	C	M	GenX	2520	NA
## 1212	g	C	M	GenX	2520	NA
## 1213	g	C	M	GenX	2520	NA
## 1214	g	C	M	GenX	2520	NA
## 1215	g	C	M	GenX	2520	NA
## 1216	g	C	M	GenX	2520	NA
## 1217	g	C	M	GenX	2520	NA
## 1218	g	C	M	GenX	2520	NA
## 1219	g	C	M	GenX	2520	NA
## 1220	g	C	M	GenX	2520	NA
## 1221	g	C	M	Millenial	2520	NA
## 1222	g	C	M	Millenial	2520	NA
## 1223	g	C	M	Millenial	2520	NA
## 1224	g	C	M	Millenial	2520	NA
## 1225	g	C	M	Millenial	2520	NA
## 1226	g	C	M	Millenial	2520	NA
## 1227	g	C	M	Millenial	2520	NA
## 1228	g	C	M	Millenial	2520	NA
## 1229	g	C	M	Millenial	2520	NA
## 1230	g	C	M	Millenial	2520	NA
## 1231	g	C	F	Boomer	2520	NA
## 1232	g	C	F	Boomer	2520	NA
## 1233	g	C	F	Boomer	2520	NA
## 1234	g	C	F	Boomer	2520	NA
## 1235	g	C	F	Boomer	2520	NA
## 1236	g	C	F	Boomer	2520	NA
## 1237	g	C	F	Boomer	2520	NA
## 1238	g	C	F	Boomer	2520	NA
## 1239	g	C	F	Boomer	2520	NA
## 1240	g	C	F	Boomer	2520	NA
## 1241	g	C	F	GenX	2520	NA
## 1242	g	C	F	GenX	2520	NA
## 1243	g	C	F	GenX	2520	NA
## 1244	g	C	F	GenX	2520	NA
## 1245	g	C	F	GenX	2520	NA
## 1246	g	C	F	GenX	2520	NA

## 1247	g	C	F	GenX	2520	NA
## 1248	g	C	F	GenX	2520	NA
## 1249	g	C	F	GenX	2520	NA
## 1250	g	C	F	GenX	2520	NA
## 1251	g	C	F	Millenial	2520	NA
## 1252	g	C	F	Millenial	2520	NA
## 1253	g	C	F	Millenial	2520	NA
## 1254	g	C	F	Millenial	2520	NA
## 1255	g	C	F	Millenial	2520	NA
## 1256	g	C	F	Millenial	2520	NA
## 1257	g	C	F	Millenial	2520	NA
## 1258	g	C	F	Millenial	2520	NA
## 1259	g	C	F	Millenial	2520	NA
## 1260	g	C	F	Millenial	2520	NA
## 1261	h	A	M	Boomer	2520	NA
## 1262	h	A	M	Boomer	2520	NA
## 1263	h	A	M	Boomer	2520	NA
## 1264	h	A	M	Boomer	2520	NA
## 1265	h	A	M	Boomer	2520	NA
## 1266	h	A	M	Boomer	2520	NA
## 1267	h	A	M	Boomer	2520	NA
## 1268	h	A	M	Boomer	2520	NA
## 1269	h	A	M	Boomer	2520	NA
## 1270	h	A	M	Boomer	2520	NA
## 1271	h	A	M	GenX	2520	NA
## 1272	h	A	M	GenX	2520	NA
## 1273	h	A	M	GenX	2520	NA
## 1274	h	A	M	GenX	2520	NA
## 1275	h	A	M	GenX	2520	NA
## 1276	h	A	M	GenX	2520	NA
## 1277	h	A	M	GenX	2520	NA
## 1278	h	A	M	GenX	2520	NA
## 1279	h	A	M	GenX	2520	NA
## 1280	h	A	M	GenX	2520	NA
## 1281	h	A	M	Millenial	2520	NA
## 1282	h	A	M	Millenial	2520	NA
## 1283	h	A	M	Millenial	2520	NA
## 1284	h	A	M	Millenial	2520	NA
## 1285	h	A	M	Millenial	2520	NA
## 1286	h	A	M	Millenial	2520	NA
## 1287	h	A	M	Millenial	2520	NA
## 1288	h	A	M	Millenial	2520	NA
## 1289	h	A	M	Millenial	2520	NA
## 1290	h	A	M	Millenial	2520	NA
## 1291	h	A	F	Boomer	2520	NA
## 1292	h	A	F	Boomer	2520	NA
## 1293	h	A	F	Boomer	2520	NA
## 1294	h	A	F	Boomer	2520	NA
## 1295	h	A	F	Boomer	2520	NA
## 1296	h	A	F	Boomer	2520	NA
## 1297	h	A	F	Boomer	2520	NA
## 1298	h	A	F	Boomer	2520	NA
## 1299	h	A	F	Boomer	2520	NA
## 1300	h	A	F	Boomer	2520	NA

## 1301	h	A	F	GenX	2520	NA
## 1302	h	A	F	GenX	2520	NA
## 1303	h	A	F	GenX	2520	NA
## 1304	h	A	F	GenX	2520	NA
## 1305	h	A	F	GenX	2520	NA
## 1306	h	A	F	GenX	2520	NA
## 1307	h	A	F	GenX	2520	NA
## 1308	h	A	F	GenX	2520	NA
## 1309	h	A	F	GenX	2520	NA
## 1310	h	A	F	GenX	2520	NA
## 1311	h	A	F	Millenial	2520	NA
## 1312	h	A	F	Millenial	2520	NA
## 1313	h	A	F	Millenial	2520	NA
## 1314	h	A	F	Millenial	2520	NA
## 1315	h	A	F	Millenial	2520	NA
## 1316	h	A	F	Millenial	2520	NA
## 1317	h	A	F	Millenial	2520	NA
## 1318	h	A	F	Millenial	2520	NA
## 1319	h	A	F	Millenial	2520	NA
## 1320	h	A	F	Millenial	2520	NA
## 1321	h	B	M	Boomer	2520	NA
## 1322	h	B	M	Boomer	2520	NA
## 1323	h	B	M	Boomer	2520	NA
## 1324	h	B	M	Boomer	2520	NA
## 1325	h	B	M	Boomer	2520	NA
## 1326	h	B	M	Boomer	2520	NA
## 1327	h	B	M	Boomer	2520	NA
## 1328	h	B	M	Boomer	2520	NA
## 1329	h	B	M	Boomer	2520	NA
## 1330	h	B	M	Boomer	2520	NA
## 1331	h	B	M	GenX	2520	NA
## 1332	h	B	M	GenX	2520	NA
## 1333	h	B	M	GenX	2520	NA
## 1334	h	B	M	GenX	2520	NA
## 1335	h	B	M	GenX	2520	NA
## 1336	h	B	M	GenX	2520	NA
## 1337	h	B	M	GenX	2520	NA
## 1338	h	B	M	GenX	2520	NA
## 1339	h	B	M	GenX	2520	NA
## 1340	h	B	M	GenX	2520	NA
## 1341	h	B	M	Millenial	2520	NA
## 1342	h	B	M	Millenial	2520	NA
## 1343	h	B	M	Millenial	2520	NA
## 1344	h	B	M	Millenial	2520	NA
## 1345	h	B	M	Millenial	2520	NA
## 1346	h	B	M	Millenial	2520	NA
## 1347	h	B	M	Millenial	2520	NA
## 1348	h	B	M	Millenial	2520	NA
## 1349	h	B	M	Millenial	2520	NA
## 1350	h	B	M	Millenial	2520	NA
## 1351	h	B	F	Boomer	2520	NA
## 1352	h	B	F	Boomer	2520	NA
## 1353	h	B	F	Boomer	2520	NA
## 1354	h	B	F	Boomer	2520	NA

## 1355	h	B	F	Boomer	2520	NA
## 1356	h	B	F	Boomer	2520	NA
## 1357	h	B	F	Boomer	2520	NA
## 1358	h	B	F	Boomer	2520	NA
## 1359	h	B	F	Boomer	2520	NA
## 1360	h	B	F	Boomer	2520	NA
## 1361	h	B	F	GenX	2520	NA
## 1362	h	B	F	GenX	2520	NA
## 1363	h	B	F	GenX	2520	NA
## 1364	h	B	F	GenX	2520	NA
## 1365	h	B	F	GenX	2520	NA
## 1366	h	B	F	GenX	2520	NA
## 1367	h	B	F	GenX	2520	NA
## 1368	h	B	F	GenX	2520	NA
## 1369	h	B	F	GenX	2520	NA
## 1370	h	B	F	GenX	2520	NA
## 1371	h	B	F	Millennial	2520	NA
## 1372	h	B	F	Millennial	2520	NA
## 1373	h	B	F	Millennial	2520	NA
## 1374	h	B	F	Millennial	2520	NA
## 1375	h	B	F	Millennial	2520	NA
## 1376	h	B	F	Millennial	2520	NA
## 1377	h	B	F	Millennial	2520	NA
## 1378	h	B	F	Millennial	2520	NA
## 1379	h	B	F	Millennial	2520	NA
## 1380	h	B	F	Millennial	2520	NA
## 1381	h	C	M	Boomer	2520	NA
## 1382	h	C	M	Boomer	2520	NA
## 1383	h	C	M	Boomer	2520	NA
## 1384	h	C	M	Boomer	2520	NA
## 1385	h	C	M	Boomer	2520	NA
## 1386	h	C	M	Boomer	2520	NA
## 1387	h	C	M	Boomer	2520	NA
## 1388	h	C	M	Boomer	2520	NA
## 1389	h	C	M	Boomer	2520	NA
## 1390	h	C	M	Boomer	2520	NA
## 1391	h	C	M	GenX	2520	NA
## 1392	h	C	M	GenX	2520	NA
## 1393	h	C	M	GenX	2520	NA
## 1394	h	C	M	GenX	2520	NA
## 1395	h	C	M	GenX	2520	NA
## 1396	h	C	M	GenX	2520	NA
## 1397	h	C	M	GenX	2520	NA
## 1398	h	C	M	GenX	2520	NA
## 1399	h	C	M	GenX	2520	NA
## 1400	h	C	M	GenX	2520	NA
## 1401	h	C	M	Millennial	2520	NA
## 1402	h	C	M	Millennial	2520	NA
## 1403	h	C	M	Millennial	2520	NA
## 1404	h	C	M	Millennial	2520	NA
## 1405	h	C	M	Millennial	2520	NA
## 1406	h	C	M	Millennial	2520	NA
## 1407	h	C	M	Millennial	2520	NA
## 1408	h	C	M	Millennial	2520	NA

## 1409	h	C	M	Millenial	2520	NA
## 1410	h	C	M	Millenial	2520	NA
## 1411	h	C	F	Boomer	2520	NA
## 1412	h	C	F	Boomer	2520	NA
## 1413	h	C	F	Boomer	2520	NA
## 1414	h	C	F	Boomer	2520	NA
## 1415	h	C	F	Boomer	2520	NA
## 1416	h	C	F	Boomer	2520	NA
## 1417	h	C	F	Boomer	2520	NA
## 1418	h	C	F	Boomer	2520	NA
## 1419	h	C	F	Boomer	2520	NA
## 1420	h	C	F	Boomer	2520	NA
## 1421	h	C	F	GenX	2520	NA
## 1422	h	C	F	GenX	2520	NA
## 1423	h	C	F	GenX	2520	NA
## 1424	h	C	F	GenX	2520	NA
## 1425	h	C	F	GenX	2520	NA
## 1426	h	C	F	GenX	2520	NA
## 1427	h	C	F	GenX	2520	NA
## 1428	h	C	F	GenX	2520	NA
## 1429	h	C	F	GenX	2520	NA
## 1430	h	C	F	GenX	2520	NA
## 1431	h	C	F	Millenial	2520	NA
## 1432	h	C	F	Millenial	2520	NA
## 1433	h	C	F	Millenial	2520	NA
## 1434	h	C	F	Millenial	2520	NA
## 1435	h	C	F	Millenial	2520	NA
## 1436	h	C	F	Millenial	2520	NA
## 1437	h	C	F	Millenial	2520	NA
## 1438	h	C	F	Millenial	2520	NA
## 1439	h	C	F	Millenial	2520	NA
## 1440	h	C	F	Millenial	2520	NA
## 1441	i	A	M	Boomer	2520	NA
## 1442	i	A	M	Boomer	2520	NA
## 1443	i	A	M	Boomer	2520	NA
## 1444	i	A	M	Boomer	2520	NA
## 1445	i	A	M	Boomer	2520	NA
## 1446	i	A	M	Boomer	2520	NA
## 1447	i	A	M	Boomer	2520	NA
## 1448	i	A	M	Boomer	2520	NA
## 1449	i	A	M	Boomer	2520	NA
## 1450	i	A	M	Boomer	2520	NA
## 1451	i	A	M	GenX	2520	NA
## 1452	i	A	M	GenX	2520	NA
## 1453	i	A	M	GenX	2520	NA
## 1454	i	A	M	GenX	2520	NA
## 1455	i	A	M	GenX	2520	NA
## 1456	i	A	M	GenX	2520	NA
## 1457	i	A	M	GenX	2520	NA
## 1458	i	A	M	GenX	2520	NA
## 1459	i	A	M	GenX	2520	NA
## 1460	i	A	M	GenX	2520	NA
## 1461	i	A	M	Millenial	2520	NA
## 1462	i	A	M	Millenial	2520	NA

## 1463	i	A	M	Millenial	2520	NA
## 1464	i	A	M	Millenial	2520	NA
## 1465	i	A	M	Millenial	2520	NA
## 1466	i	A	M	Millenial	2520	NA
## 1467	i	A	M	Millenial	2520	NA
## 1468	i	A	M	Millenial	2520	NA
## 1469	i	A	M	Millenial	2520	NA
## 1470	i	A	M	Millenial	2520	NA
## 1471	i	A	F	Boomer	2520	NA
## 1472	i	A	F	Boomer	2520	NA
## 1473	i	A	F	Boomer	2520	NA
## 1474	i	A	F	Boomer	2520	NA
## 1475	i	A	F	Boomer	2520	NA
## 1476	i	A	F	Boomer	2520	NA
## 1477	i	A	F	Boomer	2520	NA
## 1478	i	A	F	Boomer	2520	NA
## 1479	i	A	F	Boomer	2520	NA
## 1480	i	A	F	Boomer	2520	NA
## 1481	i	A	F	GenX	2520	NA
## 1482	i	A	F	GenX	2520	NA
## 1483	i	A	F	GenX	2520	NA
## 1484	i	A	F	GenX	2520	NA
## 1485	i	A	F	GenX	2520	NA
## 1486	i	A	F	GenX	2520	NA
## 1487	i	A	F	GenX	2520	NA
## 1488	i	A	F	GenX	2520	NA
## 1489	i	A	F	GenX	2520	NA
## 1490	i	A	F	GenX	2520	NA
## 1491	i	A	F	Millenial	2520	NA
## 1492	i	A	F	Millenial	2520	NA
## 1493	i	A	F	Millenial	2520	NA
## 1494	i	A	F	Millenial	2520	NA
## 1495	i	A	F	Millenial	2520	NA
## 1496	i	A	F	Millenial	2520	NA
## 1497	i	A	F	Millenial	2520	NA
## 1498	i	A	F	Millenial	2520	NA
## 1499	i	A	F	Millenial	2520	NA
## 1500	i	A	F	Millenial	2520	NA
## 1501	i	B	M	Boomer	2520	NA
## 1502	i	B	M	Boomer	2520	NA
## 1503	i	B	M	Boomer	2520	NA
## 1504	i	B	M	Boomer	2520	NA
## 1505	i	B	M	Boomer	2520	NA
## 1506	i	B	M	Boomer	2520	NA
## 1507	i	B	M	Boomer	2520	NA
## 1508	i	B	M	Boomer	2520	NA
## 1509	i	B	M	Boomer	2520	NA
## 1510	i	B	M	Boomer	2520	NA
## 1511	i	B	M	GenX	2520	NA
## 1512	i	B	M	GenX	2520	NA
## 1513	i	B	M	GenX	2520	NA
## 1514	i	B	M	GenX	2520	NA
## 1515	i	B	M	GenX	2520	NA
## 1516	i	B	M	GenX	2520	NA



## 1517	i	B	M	GenX	2520	NA
## 1518	i	B	M	GenX	2520	NA
## 1519	i	B	M	GenX	2520	NA
## 1520	i	B	M	GenX	2520	NA
## 1521	i	B	M	Millenial	2520	NA
## 1522	i	B	M	Millenial	2520	NA
## 1523	i	B	M	Millenial	2520	NA
## 1524	i	B	M	Millenial	2520	NA
## 1525	i	B	M	Millenial	2520	NA
## 1526	i	B	M	Millenial	2520	NA
## 1527	i	B	M	Millenial	2520	NA
## 1528	i	B	M	Millenial	2520	NA
## 1529	i	B	M	Millenial	2520	NA
## 1530	i	B	M	Millenial	2520	NA
## 1531	i	B	F	Boomer	2520	NA
## 1532	i	B	F	Boomer	2520	NA
## 1533	i	B	F	Boomer	2520	NA
## 1534	i	B	F	Boomer	2520	NA
## 1535	i	B	F	Boomer	2520	NA
## 1536	i	B	F	Boomer	2520	NA
## 1537	i	B	F	Boomer	2520	NA
## 1538	i	B	F	Boomer	2520	NA
## 1539	i	B	F	Boomer	2520	NA
## 1540	i	B	F	Boomer	2520	NA
## 1541	i	B	F	GenX	2520	NA
## 1542	i	B	F	GenX	2520	NA
## 1543	i	B	F	GenX	2520	NA
## 1544	i	B	F	GenX	2520	NA
## 1545	i	B	F	GenX	2520	NA
## 1546	i	B	F	GenX	2520	NA
## 1547	i	B	F	GenX	2520	NA
## 1548	i	B	F	GenX	2520	NA
## 1549	i	B	F	GenX	2520	NA
## 1550	i	B	F	GenX	2520	NA
## 1551	i	B	F	Millenial	2520	NA
## 1552	i	B	F	Millenial	2520	NA
## 1553	i	B	F	Millenial	2520	NA
## 1554	i	B	F	Millenial	2520	NA
## 1555	i	B	F	Millenial	2520	NA
## 1556	i	B	F	Millenial	2520	NA
## 1557	i	B	F	Millenial	2520	NA
## 1558	i	B	F	Millenial	2520	NA
## 1559	i	B	F	Millenial	2520	NA
## 1560	i	B	F	Millenial	2520	NA
## 1561	i	C	M	Boomer	2520	NA
## 1562	i	C	M	Boomer	2520	NA
## 1563	i	C	M	Boomer	2520	NA
## 1564	i	C	M	Boomer	2520	NA
## 1565	i	C	M	Boomer	2520	NA
## 1566	i	C	M	Boomer	2520	NA
## 1567	i	C	M	Boomer	2520	NA
## 1568	i	C	M	Boomer	2520	NA
## 1569	i	C	M	Boomer	2520	NA
## 1570	i	C	M	Boomer	2520	NA

## 1571	i	C	M	GenX	2520	NA
## 1572	i	C	M	GenX	2520	NA
## 1573	i	C	M	GenX	2520	NA
## 1574	i	C	M	GenX	2520	NA
## 1575	i	C	M	GenX	2520	NA
## 1576	i	C	M	GenX	2520	NA
## 1577	i	C	M	GenX	2520	NA
## 1578	i	C	M	GenX	2520	NA
## 1579	i	C	M	GenX	2520	NA
## 1580	i	C	M	GenX	2520	NA
## 1581	i	C	M	Millennial	2520	NA
## 1582	i	C	M	Millennial	2520	NA
## 1583	i	C	M	Millennial	2520	NA
## 1584	i	C	M	Millennial	2520	NA
## 1585	i	C	M	Millennial	2520	NA
## 1586	i	C	M	Millennial	2520	NA
## 1587	i	C	M	Millennial	2520	NA
## 1588	i	C	M	Millennial	2520	NA
## 1589	i	C	M	Millennial	2520	NA
## 1590	i	C	M	Millennial	2520	NA
## 1591	i	C	F	Boomer	2520	NA
## 1592	i	C	F	Boomer	2520	NA
## 1593	i	C	F	Boomer	2520	NA
## 1594	i	C	F	Boomer	2520	NA
## 1595	i	C	F	Boomer	2520	NA
## 1596	i	C	F	Boomer	2520	NA
## 1597	i	C	F	Boomer	2520	NA
## 1598	i	C	F	Boomer	2520	NA
## 1599	i	C	F	Boomer	2520	NA
## 1600	i	C	F	Boomer	2520	NA
## 1601	i	C	F	GenX	2520	NA
## 1602	i	C	F	GenX	2520	NA
## 1603	i	C	F	GenX	2520	NA
## 1604	i	C	F	GenX	2520	NA
## 1605	i	C	F	GenX	2520	NA
## 1606	i	C	F	GenX	2520	NA
## 1607	i	C	F	GenX	2520	NA
## 1608	i	C	F	GenX	2520	NA
## 1609	i	C	F	GenX	2520	NA
## 1610	i	C	F	GenX	2520	NA
## 1611	i	C	F	Millennial	2520	NA
## 1612	i	C	F	Millennial	2520	NA
## 1613	i	C	F	Millennial	2520	NA
## 1614	i	C	F	Millennial	2520	NA
## 1615	i	C	F	Millennial	2520	NA
## 1616	i	C	F	Millennial	2520	NA
## 1617	i	C	F	Millennial	2520	NA
## 1618	i	C	F	Millennial	2520	NA
## 1619	i	C	F	Millennial	2520	NA
## 1620	i	C	F	Millennial	2520	NA
## 1621	j	A	M	Boomer	2520	NA
## 1622	j	A	M	Boomer	2520	NA
## 1623	j	A	M	Boomer	2520	NA
## 1624	j	A	M	Boomer	2520	NA

## 1625	j	A	M	Boomer	2520	NA
## 1626	j	A	M	Boomer	2520	NA
## 1627	j	A	M	Boomer	2520	NA
## 1628	j	A	M	Boomer	2520	NA
## 1629	j	A	M	Boomer	2520	NA
## 1630	j	A	M	Boomer	2520	NA
## 1631	j	A	M	GenX	2520	NA
## 1632	j	A	M	GenX	2520	NA
## 1633	j	A	M	GenX	2520	NA
## 1634	j	A	M	GenX	2520	NA
## 1635	j	A	M	GenX	2520	NA
## 1636	j	A	M	GenX	2520	NA
## 1637	j	A	M	GenX	2520	NA
## 1638	j	A	M	GenX	2520	NA
## 1639	j	A	M	GenX	2520	NA
## 1640	j	A	M	GenX	2520	NA
## 1641	j	A	M	Millenial	2520	NA
## 1642	j	A	M	Millenial	2520	NA
## 1643	j	A	M	Millenial	2520	NA
## 1644	j	A	M	Millenial	2520	NA
## 1645	j	A	M	Millenial	2520	NA
## 1646	j	A	M	Millenial	2520	NA
## 1647	j	A	M	Millenial	2520	NA
## 1648	j	A	M	Millenial	2520	NA
## 1649	j	A	M	Millenial	2520	NA
## 1650	j	A	M	Millenial	2520	NA
## 1651	j	A	F	Boomer	2520	NA
## 1652	j	A	F	Boomer	2520	NA
## 1653	j	A	F	Boomer	2520	NA
## 1654	j	A	F	Boomer	2520	NA
## 1655	j	A	F	Boomer	2520	NA
## 1656	j	A	F	Boomer	2520	NA
## 1657	j	A	F	Boomer	2520	NA
## 1658	j	A	F	Boomer	2520	NA
## 1659	j	A	F	Boomer	2520	NA
## 1660	j	A	F	Boomer	2520	NA
## 1661	j	A	F	GenX	2520	NA
## 1662	j	A	F	GenX	2520	NA
## 1663	j	A	F	GenX	2520	NA
## 1664	j	A	F	GenX	2520	NA
## 1665	j	A	F	GenX	2520	NA
## 1666	j	A	F	GenX	2520	NA
## 1667	j	A	F	GenX	2520	NA
## 1668	j	A	F	GenX	2520	NA
## 1669	j	A	F	GenX	2520	NA
## 1670	j	A	F	GenX	2520	NA
## 1671	j	A	F	Millenial	2520	NA
## 1672	j	A	F	Millenial	2520	NA
## 1673	j	A	F	Millenial	2520	NA
## 1674	j	A	F	Millenial	2520	NA
## 1675	j	A	F	Millenial	2520	NA
## 1676	j	A	F	Millenial	2520	NA
## 1677	j	A	F	Millenial	2520	NA
## 1678	j	A	F	Millenial	2520	NA

## 1679	j	A	F	Millenial	2520	NA
## 1680	j	A	F	Millenial	2520	NA
## 1681	j	B	M	Boomer	2520	NA
## 1682	j	B	M	Boomer	2520	NA
## 1683	j	B	M	Boomer	2520	NA
## 1684	j	B	M	Boomer	2520	NA
## 1685	j	B	M	Boomer	2520	NA
## 1686	j	B	M	Boomer	2520	NA
## 1687	j	B	M	Boomer	2520	NA
## 1688	j	B	M	Boomer	2520	NA
## 1689	j	B	M	Boomer	2520	NA
## 1690	j	B	M	Boomer	2520	NA
## 1691	j	B	M	GenX	2520	NA
## 1692	j	B	M	GenX	2520	NA
## 1693	j	B	M	GenX	2520	NA
## 1694	j	B	M	GenX	2520	NA
## 1695	j	B	M	GenX	2520	NA
## 1696	j	B	M	GenX	2520	NA
## 1697	j	B	M	GenX	2520	NA
## 1698	j	B	M	GenX	2520	NA
## 1699	j	B	M	GenX	2520	NA
## 1700	j	B	M	GenX	2520	NA
## 1701	j	B	M	Millenial	2520	NA
## 1702	j	B	M	Millenial	2520	NA
## 1703	j	B	M	Millenial	2520	NA
## 1704	j	B	M	Millenial	2520	NA
## 1705	j	B	M	Millenial	2520	NA
## 1706	j	B	M	Millenial	2520	NA
## 1707	j	B	M	Millenial	2520	NA
## 1708	j	B	M	Millenial	2520	NA
## 1709	j	B	M	Millenial	2520	NA
## 1710	j	B	M	Millenial	2520	NA
## 1711	j	B	F	Boomer	2520	NA
## 1712	j	B	F	Boomer	2520	NA
## 1713	j	B	F	Boomer	2520	NA
## 1714	j	B	F	Boomer	2520	NA
## 1715	j	B	F	Boomer	2520	NA
## 1716	j	B	F	Boomer	2520	NA
## 1717	j	B	F	Boomer	2520	NA
## 1718	j	B	F	Boomer	2520	NA
## 1719	j	B	F	Boomer	2520	NA
## 1720	j	B	F	Boomer	2520	NA
## 1721	j	B	F	GenX	2520	NA
## 1722	j	B	F	GenX	2520	NA
## 1723	j	B	F	GenX	2520	NA
## 1724	j	B	F	GenX	2520	NA
## 1725	j	B	F	GenX	2520	NA
## 1726	j	B	F	GenX	2520	NA
## 1727	j	B	F	GenX	2520	NA
## 1728	j	B	F	GenX	2520	NA
## 1729	j	B	F	GenX	2520	NA
## 1730	j	B	F	GenX	2520	NA
## 1731	j	B	F	Millenial	2520	NA
## 1732	j	B	F	Millenial	2520	NA

## 1733	j	B	F	Millenial	2520	NA
## 1734	j	B	F	Millenial	2520	NA
## 1735	j	B	F	Millenial	2520	NA
## 1736	j	B	F	Millenial	2520	NA
## 1737	j	B	F	Millenial	2520	NA
## 1738	j	B	F	Millenial	2520	NA
## 1739	j	B	F	Millenial	2520	NA
## 1740	j	B	F	Millenial	2520	NA
## 1741	j	C	M	Boomer	2520	NA
## 1742	j	C	M	Boomer	2520	NA
## 1743	j	C	M	Boomer	2520	NA
## 1744	j	C	M	Boomer	2520	NA
## 1745	j	C	M	Boomer	2520	NA
## 1746	j	C	M	Boomer	2520	NA
## 1747	j	C	M	Boomer	2520	NA
## 1748	j	C	M	Boomer	2520	NA
## 1749	j	C	M	Boomer	2520	NA
## 1750	j	C	M	Boomer	2520	NA
## 1751	j	C	M	GenX	2520	NA
## 1752	j	C	M	GenX	2520	NA
## 1753	j	C	M	GenX	2520	NA
## 1754	j	C	M	GenX	2520	NA
## 1755	j	C	M	GenX	2520	NA
## 1756	j	C	M	GenX	2520	NA
## 1757	j	C	M	GenX	2520	NA
## 1758	j	C	M	GenX	2520	NA
## 1759	j	C	M	GenX	2520	NA
## 1760	j	C	M	GenX	2520	NA
## 1761	j	C	M	Millenial	2520	NA
## 1762	j	C	M	Millenial	2520	NA
## 1763	j	C	M	Millenial	2520	NA
## 1764	j	C	M	Millenial	2520	NA
## 1765	j	C	M	Millenial	2520	NA
## 1766	j	C	M	Millenial	2520	NA
## 1767	j	C	M	Millenial	2520	NA
## 1768	j	C	M	Millenial	2520	NA
## 1769	j	C	M	Millenial	2520	NA
## 1770	j	C	M	Millenial	2520	NA
## 1771	j	C	F	Boomer	2520	NA
## 1772	j	C	F	Boomer	2520	NA
## 1773	j	C	F	Boomer	2520	NA
## 1774	j	C	F	Boomer	2520	NA
## 1775	j	C	F	Boomer	2520	NA
## 1776	j	C	F	Boomer	2520	NA
## 1777	j	C	F	Boomer	2520	NA
## 1778	j	C	F	Boomer	2520	NA
## 1779	j	C	F	Boomer	2520	NA
## 1780	j	C	F	Boomer	2520	NA
## 1781	j	C	F	GenX	2520	NA
## 1782	j	C	F	GenX	2520	NA
## 1783	j	C	F	GenX	2520	NA
## 1784	j	C	F	GenX	2520	NA
## 1785	j	C	F	GenX	2520	NA
## 1786	j	C	F	GenX	2520	NA

## 1787	j	C	F	GenX	2520	NA
## 1788	j	C	F	GenX	2520	NA
## 1789	j	C	F	GenX	2520	NA
## 1790	j	C	F	GenX	2520	NA
## 1791	j	C	F	Millennial	2520	NA
## 1792	j	C	F	Millennial	2520	NA
## 1793	j	C	F	Millennial	2520	NA
## 1794	j	C	F	Millennial	2520	NA
## 1795	j	C	F	Millennial	2520	NA
## 1796	j	C	F	Millennial	2520	NA
## 1797	j	C	F	Millennial	2520	NA
## 1798	j	C	F	Millennial	2520	NA
## 1799	j	C	F	Millennial	2520	NA
## 1800	j	C	F	Millennial	2520	NA
## 1801	k	A	M	Boomer	2520	NA
## 1802	k	A	M	Boomer	2520	NA
## 1803	k	A	M	Boomer	2520	NA
## 1804	k	A	M	Boomer	2520	NA
## 1805	k	A	M	Boomer	2520	NA
## 1806	k	A	M	Boomer	2520	NA
## 1807	k	A	M	Boomer	2520	NA
## 1808	k	A	M	Boomer	2520	NA
## 1809	k	A	M	Boomer	2520	NA
## 1810	k	A	M	Boomer	2520	NA
## 1811	k	A	M	GenX	2520	NA
## 1812	k	A	M	GenX	2520	NA
## 1813	k	A	M	GenX	2520	NA
## 1814	k	A	M	GenX	2520	NA
## 1815	k	A	M	GenX	2520	NA
## 1816	k	A	M	GenX	2520	NA
## 1817	k	A	M	GenX	2520	NA
## 1818	k	A	M	GenX	2520	NA
## 1819	k	A	M	GenX	2520	NA
## 1820	k	A	M	GenX	2520	NA
## 1821	k	A	M	Millennial	2520	NA
## 1822	k	A	M	Millennial	2520	NA
## 1823	k	A	M	Millennial	2520	NA
## 1824	k	A	M	Millennial	2520	NA
## 1825	k	A	M	Millennial	2520	NA
## 1826	k	A	M	Millennial	2520	NA
## 1827	k	A	M	Millennial	2520	NA
## 1828	k	A	M	Millennial	2520	NA
## 1829	k	A	M	Millennial	2520	NA
## 1830	k	A	M	Millennial	2520	NA
## 1831	k	A	F	Boomer	2520	NA
## 1832	k	A	F	Boomer	2520	NA
## 1833	k	A	F	Boomer	2520	NA
## 1834	k	A	F	Boomer	2520	NA
## 1835	k	A	F	Boomer	2520	NA
## 1836	k	A	F	Boomer	2520	NA
## 1837	k	A	F	Boomer	2520	NA
## 1838	k	A	F	Boomer	2520	NA
## 1839	k	A	F	Boomer	2520	NA
## 1840	k	A	F	Boomer	2520	NA

## 1841	k	A	F	GenX	2520	NA
## 1842	k	A	F	GenX	2520	NA
## 1843	k	A	F	GenX	2520	NA
## 1844	k	A	F	GenX	2520	NA
## 1845	k	A	F	GenX	2520	NA
## 1846	k	A	F	GenX	2520	NA
## 1847	k	A	F	GenX	2520	NA
## 1848	k	A	F	GenX	2520	NA
## 1849	k	A	F	GenX	2520	NA
## 1850	k	A	F	GenX	2520	NA
## 1851	k	A	F	Millennial	2520	NA
## 1852	k	A	F	Millennial	2520	NA
## 1853	k	A	F	Millennial	2520	NA
## 1854	k	A	F	Millennial	2520	NA
## 1855	k	A	F	Millennial	2520	NA
## 1856	k	A	F	Millennial	2520	NA
## 1857	k	A	F	Millennial	2520	NA
## 1858	k	A	F	Millennial	2520	NA
## 1859	k	A	F	Millennial	2520	NA
## 1860	k	A	F	Millennial	2520	NA
## 1861	k	B	M	Boomer	2520	NA
## 1862	k	B	M	Boomer	2520	NA
## 1863	k	B	M	Boomer	2520	NA
## 1864	k	B	M	Boomer	2520	NA
## 1865	k	B	M	Boomer	2520	NA
## 1866	k	B	M	Boomer	2520	NA
## 1867	k	B	M	Boomer	2520	NA
## 1868	k	B	M	Boomer	2520	NA
## 1869	k	B	M	Boomer	2520	NA
## 1870	k	B	M	Boomer	2520	NA
## 1871	k	B	M	GenX	2520	NA
## 1872	k	B	M	GenX	2520	NA
## 1873	k	B	M	GenX	2520	NA
## 1874	k	B	M	GenX	2520	NA
## 1875	k	B	M	GenX	2520	NA
## 1876	k	B	M	GenX	2520	NA
## 1877	k	B	M	GenX	2520	NA
## 1878	k	B	M	GenX	2520	NA
## 1879	k	B	M	GenX	2520	NA
## 1880	k	B	M	GenX	2520	NA
## 1881	k	B	M	Millennial	2520	NA
## 1882	k	B	M	Millennial	2520	NA
## 1883	k	B	M	Millennial	2520	NA
## 1884	k	B	M	Millennial	2520	NA
## 1885	k	B	M	Millennial	2520	NA
## 1886	k	B	M	Millennial	2520	NA
## 1887	k	B	M	Millennial	2520	NA
## 1888	k	B	M	Millennial	2520	NA
## 1889	k	B	M	Millennial	2520	NA
## 1890	k	B	M	Millennial	2520	NA
## 1891	k	B	F	Boomer	2520	NA
## 1892	k	B	F	Boomer	2520	NA
## 1893	k	B	F	Boomer	2520	NA
## 1894	k	B	F	Boomer	2520	NA

## 1895	k	B	F	Boomer	2520	NA
## 1896	k	B	F	Boomer	2520	NA
## 1897	k	B	F	Boomer	2520	NA
## 1898	k	B	F	Boomer	2520	NA
## 1899	k	B	F	Boomer	2520	NA
## 1900	k	B	F	Boomer	2520	NA
## 1901	k	B	F	GenX	2520	NA
## 1902	k	B	F	GenX	2520	NA
## 1903	k	B	F	GenX	2520	NA
## 1904	k	B	F	GenX	2520	NA
## 1905	k	B	F	GenX	2520	NA
## 1906	k	B	F	GenX	2520	NA
## 1907	k	B	F	GenX	2520	NA
## 1908	k	B	F	GenX	2520	NA
## 1909	k	B	F	GenX	2520	NA
## 1910	k	B	F	GenX	2520	NA
## 1911	k	B	F	Millenial	2520	NA
## 1912	k	B	F	Millenial	2520	NA
## 1913	k	B	F	Millenial	2520	NA
## 1914	k	B	F	Millenial	2520	NA
## 1915	k	B	F	Millenial	2520	NA
## 1916	k	B	F	Millenial	2520	NA
## 1917	k	B	F	Millenial	2520	NA
## 1918	k	B	F	Millenial	2520	NA
## 1919	k	B	F	Millenial	2520	NA
## 1920	k	B	F	Millenial	2520	NA
## 1921	k	C	M	Boomer	2520	NA
## 1922	k	C	M	Boomer	2520	NA
## 1923	k	C	M	Boomer	2520	NA
## 1924	k	C	M	Boomer	2520	NA
## 1925	k	C	M	Boomer	2520	NA
## 1926	k	C	M	Boomer	2520	NA
## 1927	k	C	M	Boomer	2520	NA
## 1928	k	C	M	Boomer	2520	NA
## 1929	k	C	M	Boomer	2520	NA
## 1930	k	C	M	Boomer	2520	NA
## 1931	k	C	M	GenX	2520	NA
## 1932	k	C	M	GenX	2520	NA
## 1933	k	C	M	GenX	2520	NA
## 1934	k	C	M	GenX	2520	NA
## 1935	k	C	M	GenX	2520	NA
## 1936	k	C	M	GenX	2520	NA
## 1937	k	C	M	GenX	2520	NA
## 1938	k	C	M	GenX	2520	NA
## 1939	k	C	M	GenX	2520	NA
## 1940	k	C	M	GenX	2520	NA
## 1941	k	C	M	Millenial	2520	NA
## 1942	k	C	M	Millenial	2520	NA
## 1943	k	C	M	Millenial	2520	NA
## 1944	k	C	M	Millenial	2520	NA
## 1945	k	C	M	Millenial	2520	NA
## 1946	k	C	M	Millenial	2520	NA
## 1947	k	C	M	Millenial	2520	NA
## 1948	k	C	M	Millenial	2520	NA



## 1949	k	C	M	Millenial	2520	NA
## 1950	k	C	M	Millenial	2520	NA
## 1951	k	C	F	Boomer	2520	NA
## 1952	k	C	F	Boomer	2520	NA
## 1953	k	C	F	Boomer	2520	NA
## 1954	k	C	F	Boomer	2520	NA
## 1955	k	C	F	Boomer	2520	NA
## 1956	k	C	F	Boomer	2520	NA
## 1957	k	C	F	Boomer	2520	NA
## 1958	k	C	F	Boomer	2520	NA
## 1959	k	C	F	Boomer	2520	NA
## 1960	k	C	F	Boomer	2520	NA
## 1961	k	C	F	GenX	2520	NA
## 1962	k	C	F	GenX	2520	NA
## 1963	k	C	F	GenX	2520	NA
## 1964	k	C	F	GenX	2520	NA
## 1965	k	C	F	GenX	2520	NA
## 1966	k	C	F	GenX	2520	NA
## 1967	k	C	F	GenX	2520	NA
## 1968	k	C	F	GenX	2520	NA
## 1969	k	C	F	GenX	2520	NA
## 1970	k	C	F	GenX	2520	NA
## 1971	k	C	F	Millenial	2520	NA
## 1972	k	C	F	Millenial	2520	NA
## 1973	k	C	F	Millenial	2520	NA
## 1974	k	C	F	Millenial	2520	NA
## 1975	k	C	F	Millenial	2520	NA
## 1976	k	C	F	Millenial	2520	NA
## 1977	k	C	F	Millenial	2520	NA
## 1978	k	C	F	Millenial	2520	NA
## 1979	k	C	F	Millenial	2520	NA
## 1980	k	C	F	Millenial	2520	NA
## 1981	l	A	M	Boomer	2520	NA
## 1982	l	A	M	Boomer	2520	NA
## 1983	l	A	M	Boomer	2520	NA
## 1984	l	A	M	Boomer	2520	NA
## 1985	l	A	M	Boomer	2520	NA
## 1986	l	A	M	Boomer	2520	NA
## 1987	l	A	M	Boomer	2520	NA
## 1988	l	A	M	Boomer	2520	NA
## 1989	l	A	M	Boomer	2520	NA
## 1990	l	A	M	Boomer	2520	NA
## 1991	l	A	M	GenX	2520	NA
## 1992	l	A	M	GenX	2520	NA
## 1993	l	A	M	GenX	2520	NA
## 1994	l	A	M	GenX	2520	NA
## 1995	l	A	M	GenX	2520	NA
## 1996	l	A	M	GenX	2520	NA
## 1997	l	A	M	GenX	2520	NA
## 1998	l	A	M	GenX	2520	NA
## 1999	l	A	M	GenX	2520	NA
## 2000	l	A	M	GenX	2520	NA
## 2001	l	A	M	Millenial	2520	NA
## 2002	l	A	M	Millenial	2520	NA

## 2003	1	A	M	Millenial	2520	NA
## 2004	1	A	M	Millenial	2520	NA
## 2005	1	A	M	Millenial	2520	NA
## 2006	1	A	M	Millenial	2520	NA
## 2007	1	A	M	Millenial	2520	NA
## 2008	1	A	M	Millenial	2520	NA
## 2009	1	A	M	Millenial	2520	NA
## 2010	1	A	M	Millenial	2520	NA
## 2011	1	A	F	Boomer	2520	NA
## 2012	1	A	F	Boomer	2520	NA
## 2013	1	A	F	Boomer	2520	NA
## 2014	1	A	F	Boomer	2520	NA
## 2015	1	A	F	Boomer	2520	NA
## 2016	1	A	F	Boomer	2520	NA
## 2017	1	A	F	Boomer	2520	NA
## 2018	1	A	F	Boomer	2520	NA
## 2019	1	A	F	Boomer	2520	NA
## 2020	1	A	F	Boomer	2520	NA
## 2021	1	A	F	GenX	2520	NA
## 2022	1	A	F	GenX	2520	NA
## 2023	1	A	F	GenX	2520	NA
## 2024	1	A	F	GenX	2520	NA
## 2025	1	A	F	GenX	2520	NA
## 2026	1	A	F	GenX	2520	NA
## 2027	1	A	F	GenX	2520	NA
## 2028	1	A	F	GenX	2520	NA
## 2029	1	A	F	GenX	2520	NA
## 2030	1	A	F	GenX	2520	NA
## 2031	1	A	F	Millenial	2520	NA
## 2032	1	A	F	Millenial	2520	NA
## 2033	1	A	F	Millenial	2520	NA
## 2034	1	A	F	Millenial	2520	NA
## 2035	1	A	F	Millenial	2520	NA
## 2036	1	A	F	Millenial	2520	NA
## 2037	1	A	F	Millenial	2520	NA
## 2038	1	A	F	Millenial	2520	NA
## 2039	1	A	F	Millenial	2520	NA
## 2040	1	A	F	Millenial	2520	NA
## 2041	1	B	M	Boomer	2520	NA
## 2042	1	B	M	Boomer	2520	NA
## 2043	1	B	M	Boomer	2520	NA
## 2044	1	B	M	Boomer	2520	NA
## 2045	1	B	M	Boomer	2520	NA
## 2046	1	B	M	Boomer	2520	NA
## 2047	1	B	M	Boomer	2520	NA
## 2048	1	B	M	Boomer	2520	NA
## 2049	1	B	M	Boomer	2520	NA
## 2050	1	B	M	Boomer	2520	NA
## 2051	1	B	M	GenX	2520	NA
## 2052	1	B	M	GenX	2520	NA
## 2053	1	B	M	GenX	2520	NA
## 2054	1	B	M	GenX	2520	NA
## 2055	1	B	M	GenX	2520	NA
## 2056	1	B	M	GenX	2520	NA

## 2057	1	B	M	GenX	2520	NA
## 2058	1	B	M	GenX	2520	NA
## 2059	1	B	M	GenX	2520	NA
## 2060	1	B	M	GenX	2520	NA
## 2061	1	B	M	Millenial	2520	NA
## 2062	1	B	M	Millenial	2520	NA
## 2063	1	B	M	Millenial	2520	NA
## 2064	1	B	M	Millenial	2520	NA
## 2065	1	B	M	Millenial	2520	NA
## 2066	1	B	M	Millenial	2520	NA
## 2067	1	B	M	Millenial	2520	NA
## 2068	1	B	M	Millenial	2520	NA
## 2069	1	B	M	Millenial	2520	NA
## 2070	1	B	M	Millenial	2520	NA
## 2071	1	B	F	Boomer	2520	NA
## 2072	1	B	F	Boomer	2520	NA
## 2073	1	B	F	Boomer	2520	NA
## 2074	1	B	F	Boomer	2520	NA
## 2075	1	B	F	Boomer	2520	NA
## 2076	1	B	F	Boomer	2520	NA
## 2077	1	B	F	Boomer	2520	NA
## 2078	1	B	F	Boomer	2520	NA
## 2079	1	B	F	Boomer	2520	NA
## 2080	1	B	F	Boomer	2520	NA
## 2081	1	B	F	GenX	2520	NA
## 2082	1	B	F	GenX	2520	NA
## 2083	1	B	F	GenX	2520	NA
## 2084	1	B	F	GenX	2520	NA
## 2085	1	B	F	GenX	2520	NA
## 2086	1	B	F	GenX	2520	NA
## 2087	1	B	F	GenX	2520	NA
## 2088	1	B	F	GenX	2520	NA
## 2089	1	B	F	GenX	2520	NA
## 2090	1	B	F	GenX	2520	NA
## 2091	1	B	F	Millenial	2520	NA
## 2092	1	B	F	Millenial	2520	NA
## 2093	1	B	F	Millenial	2520	NA
## 2094	1	B	F	Millenial	2520	NA
## 2095	1	B	F	Millenial	2520	NA
## 2096	1	B	F	Millenial	2520	NA
## 2097	1	B	F	Millenial	2520	NA
## 2098	1	B	F	Millenial	2520	NA
## 2099	1	B	F	Millenial	2520	NA
## 2100	1	B	F	Millenial	2520	NA
## 2101	1	C	M	Boomer	2520	NA
## 2102	1	C	M	Boomer	2520	NA
## 2103	1	C	M	Boomer	2520	NA
## 2104	1	C	M	Boomer	2520	NA
## 2105	1	C	M	Boomer	2520	NA
## 2106	1	C	M	Boomer	2520	NA
## 2107	1	C	M	Boomer	2520	NA
## 2108	1	C	M	Boomer	2520	NA
## 2109	1	C	M	Boomer	2520	NA
## 2110	1	C	M	Boomer	2520	NA

## 2111	1	C	M	GenX	2520	NA
## 2112	1	C	M	GenX	2520	NA
## 2113	1	C	M	GenX	2520	NA
## 2114	1	C	M	GenX	2520	NA
## 2115	1	C	M	GenX	2520	NA
## 2116	1	C	M	GenX	2520	NA
## 2117	1	C	M	GenX	2520	NA
## 2118	1	C	M	GenX	2520	NA
## 2119	1	C	M	GenX	2520	NA
## 2120	1	C	M	GenX	2520	NA
## 2121	1	C	M	Millenial	2520	NA
## 2122	1	C	M	Millenial	2520	NA
## 2123	1	C	M	Millenial	2520	NA
## 2124	1	C	M	Millenial	2520	NA
## 2125	1	C	M	Millenial	2520	NA
## 2126	1	C	M	Millenial	2520	NA
## 2127	1	C	M	Millenial	2520	NA
## 2128	1	C	M	Millenial	2520	NA
## 2129	1	C	M	Millenial	2520	NA
## 2130	1	C	M	Millenial	2520	NA
## 2131	1	C	F	Boomer	2520	NA
## 2132	1	C	F	Boomer	2520	NA
## 2133	1	C	F	Boomer	2520	NA
## 2134	1	C	F	Boomer	2520	NA
## 2135	1	C	F	Boomer	2520	NA
## 2136	1	C	F	Boomer	2520	NA
## 2137	1	C	F	Boomer	2520	NA
## 2138	1	C	F	Boomer	2520	NA
## 2139	1	C	F	Boomer	2520	NA
## 2140	1	C	F	Boomer	2520	NA
## 2141	1	C	F	GenX	2520	NA
## 2142	1	C	F	GenX	2520	NA
## 2143	1	C	F	GenX	2520	NA
## 2144	1	C	F	GenX	2520	NA
## 2145	1	C	F	GenX	2520	NA
## 2146	1	C	F	GenX	2520	NA
## 2147	1	C	F	GenX	2520	NA
## 2148	1	C	F	GenX	2520	NA
## 2149	1	C	F	GenX	2520	NA
## 2150	1	C	F	GenX	2520	NA
## 2151	1	C	F	Millenial	2520	NA
## 2152	1	C	F	Millenial	2520	NA
## 2153	1	C	F	Millenial	2520	NA
## 2154	1	C	F	Millenial	2520	NA
## 2155	1	C	F	Millenial	2520	NA
## 2156	1	C	F	Millenial	2520	NA
## 2157	1	C	F	Millenial	2520	NA
## 2158	1	C	F	Millenial	2520	NA
## 2159	1	C	F	Millenial	2520	NA
## 2160	1	C	F	Millenial	2520	NA
## 2161	m	A	M	Boomer	2520	NA
## 2162	m	A	M	Boomer	2520	NA
## 2163	m	A	M	Boomer	2520	NA
## 2164	m	A	M	Boomer	2520	NA

## 2165	m	A	M	Boomer	2520	NA
## 2166	m	A	M	Boomer	2520	NA
## 2167	m	A	M	Boomer	2520	NA
## 2168	m	A	M	Boomer	2520	NA
## 2169	m	A	M	Boomer	2520	NA
## 2170	m	A	M	Boomer	2520	NA
## 2171	m	A	M	GenX	2520	NA
## 2172	m	A	M	GenX	2520	NA
## 2173	m	A	M	GenX	2520	NA
## 2174	m	A	M	GenX	2520	NA
## 2175	m	A	M	GenX	2520	NA
## 2176	m	A	M	GenX	2520	NA
## 2177	m	A	M	GenX	2520	NA
## 2178	m	A	M	GenX	2520	NA
## 2179	m	A	M	GenX	2520	NA
## 2180	m	A	M	GenX	2520	NA
## 2181	m	A	M	Millennial	2520	NA
## 2182	m	A	M	Millennial	2520	NA
## 2183	m	A	M	Millennial	2520	NA
## 2184	m	A	M	Millennial	2520	NA
## 2185	m	A	M	Millennial	2520	NA
## 2186	m	A	M	Millennial	2520	NA
## 2187	m	A	M	Millennial	2520	NA
## 2188	m	A	M	Millennial	2520	NA
## 2189	m	A	M	Millennial	2520	NA
## 2190	m	A	M	Millennial	2520	NA
## 2191	m	A	F	Boomer	2520	NA
## 2192	m	A	F	Boomer	2520	NA
## 2193	m	A	F	Boomer	2520	NA
## 2194	m	A	F	Boomer	2520	NA
## 2195	m	A	F	Boomer	2520	NA
## 2196	m	A	F	Boomer	2520	NA
## 2197	m	A	F	Boomer	2520	NA
## 2198	m	A	F	Boomer	2520	NA
## 2199	m	A	F	Boomer	2520	NA
## 2200	m	A	F	Boomer	2520	NA
## 2201	m	A	F	GenX	2520	NA
## 2202	m	A	F	GenX	2520	NA
## 2203	m	A	F	GenX	2520	NA
## 2204	m	A	F	GenX	2520	NA
## 2205	m	A	F	GenX	2520	NA
## 2206	m	A	F	GenX	2520	NA
## 2207	m	A	F	GenX	2520	NA
## 2208	m	A	F	GenX	2520	NA
## 2209	m	A	F	GenX	2520	NA
## 2210	m	A	F	GenX	2520	NA
## 2211	m	A	F	Millennial	2520	NA
## 2212	m	A	F	Millennial	2520	NA
## 2213	m	A	F	Millennial	2520	NA
## 2214	m	A	F	Millennial	2520	NA
## 2215	m	A	F	Millennial	2520	NA
## 2216	m	A	F	Millennial	2520	NA
## 2217	m	A	F	Millennial	2520	NA
## 2218	m	A	F	Millennial	2520	NA

##	2219	m	A	F	Millenial	2520	NA
##	2220	m	A	F	Millenial	2520	NA
##	2221	m	B	M	Boomer	2520	NA
##	2222	m	B	M	Boomer	2520	NA
##	2223	m	B	M	Boomer	2520	NA
##	2224	m	B	M	Boomer	2520	NA
##	2225	m	B	M	Boomer	2520	NA
##	2226	m	B	M	Boomer	2520	NA
##	2227	m	B	M	Boomer	2520	NA
##	2228	m	B	M	Boomer	2520	NA
##	2229	m	B	M	Boomer	2520	NA
##	2230	m	B	M	Boomer	2520	NA
##	2231	m	B	M	GenX	2520	NA
##	2232	m	B	M	GenX	2520	NA
##	2233	m	B	M	GenX	2520	NA
##	2234	m	B	M	GenX	2520	NA
##	2235	m	B	M	GenX	2520	NA
##	2236	m	B	M	GenX	2520	NA
##	2237	m	B	M	GenX	2520	NA
##	2238	m	B	M	GenX	2520	NA
##	2239	m	B	M	GenX	2520	NA
##	2240	m	B	M	GenX	2520	NA
##	2241	m	B	M	Millenial	2520	NA
##	2242	m	B	M	Millenial	2520	NA
##	2243	m	B	M	Millenial	2520	NA
##	2244	m	B	M	Millenial	2520	NA
##	2245	m	B	M	Millenial	2520	NA
##	2246	m	B	M	Millenial	2520	NA
##	2247	m	B	M	Millenial	2520	NA
##	2248	m	B	M	Millenial	2520	NA
##	2249	m	B	M	Millenial	2520	NA
##	2250	m	B	M	Millenial	2520	NA
##	2251	m	B	F	Boomer	2520	NA
##	2252	m	B	F	Boomer	2520	NA
##	2253	m	B	F	Boomer	2520	NA
##	2254	m	B	F	Boomer	2520	NA
##	2255	m	B	F	Boomer	2520	NA
##	2256	m	B	F	Boomer	2520	NA
##	2257	m	B	F	Boomer	2520	NA
##	2258	m	B	F	Boomer	2520	NA
##	2259	m	B	F	Boomer	2520	NA
##	2260	m	B	F	Boomer	2520	NA
##	2261	m	B	F	GenX	2520	NA
##	2262	m	B	F	GenX	2520	NA
##	2263	m	B	F	GenX	2520	NA
##	2264	m	B	F	GenX	2520	NA
##	2265	m	B	F	GenX	2520	NA
##	2266	m	B	F	GenX	2520	NA
##	2267	m	B	F	GenX	2520	NA
##	2268	m	B	F	GenX	2520	NA
##	2269	m	B	F	GenX	2520	NA
##	2270	m	B	F	GenX	2520	NA
##	2271	m	B	F	Millenial	2520	NA
##	2272	m	B	F	Millenial	2520	NA

## 2273	m	B	F	Millenial	2520	NA
## 2274	m	B	F	Millenial	2520	NA
## 2275	m	B	F	Millenial	2520	NA
## 2276	m	B	F	Millenial	2520	NA
## 2277	m	B	F	Millenial	2520	NA
## 2278	m	B	F	Millenial	2520	NA
## 2279	m	B	F	Millenial	2520	NA
## 2280	m	B	F	Millenial	2520	NA
## 2281	m	C	M	Boomer	2520	NA
## 2282	m	C	M	Boomer	2520	NA
## 2283	m	C	M	Boomer	2520	NA
## 2284	m	C	M	Boomer	2520	NA
## 2285	m	C	M	Boomer	2520	NA
## 2286	m	C	M	Boomer	2520	NA
## 2287	m	C	M	Boomer	2520	NA
## 2288	m	C	M	Boomer	2520	NA
## 2289	m	C	M	Boomer	2520	NA
## 2290	m	C	M	Boomer	2520	NA
## 2291	m	C	M	GenX	2520	NA
## 2292	m	C	M	GenX	2520	NA
## 2293	m	C	M	GenX	2520	NA
## 2294	m	C	M	GenX	2520	NA
## 2295	m	C	M	GenX	2520	NA
## 2296	m	C	M	GenX	2520	NA
## 2297	m	C	M	GenX	2520	NA
## 2298	m	C	M	GenX	2520	NA
## 2299	m	C	M	GenX	2520	NA
## 2300	m	C	M	GenX	2520	NA
## 2301	m	C	M	Millenial	2520	NA
## 2302	m	C	M	Millenial	2520	NA
## 2303	m	C	M	Millenial	2520	NA
## 2304	m	C	M	Millenial	2520	NA
## 2305	m	C	M	Millenial	2520	NA
## 2306	m	C	M	Millenial	2520	NA
## 2307	m	C	M	Millenial	2520	NA
## 2308	m	C	M	Millenial	2520	NA
## 2309	m	C	M	Millenial	2520	NA
## 2310	m	C	M	Millenial	2520	NA
## 2311	m	C	F	Boomer	2520	NA
## 2312	m	C	F	Boomer	2520	NA
## 2313	m	C	F	Boomer	2520	NA
## 2314	m	C	F	Boomer	2520	NA
## 2315	m	C	F	Boomer	2520	NA
## 2316	m	C	F	Boomer	2520	NA
## 2317	m	C	F	Boomer	2520	NA
## 2318	m	C	F	Boomer	2520	NA
## 2319	m	C	F	Boomer	2520	NA
## 2320	m	C	F	Boomer	2520	NA
## 2321	m	C	F	GenX	2520	NA
## 2322	m	C	F	GenX	2520	NA
## 2323	m	C	F	GenX	2520	NA
## 2324	m	C	F	GenX	2520	NA
## 2325	m	C	F	GenX	2520	NA
## 2326	m	C	F	GenX	2520	NA

## 2327	m	C	F	GenX	2520	NA
## 2328	m	C	F	GenX	2520	NA
## 2329	m	C	F	GenX	2520	NA
## 2330	m	C	F	GenX	2520	NA
## 2331	m	C	F	Millennial	2520	NA
## 2332	m	C	F	Millennial	2520	NA
## 2333	m	C	F	Millennial	2520	NA
## 2334	m	C	F	Millennial	2520	NA
## 2335	m	C	F	Millennial	2520	NA
## 2336	m	C	F	Millennial	2520	NA
## 2337	m	C	F	Millennial	2520	NA
## 2338	m	C	F	Millennial	2520	NA
## 2339	m	C	F	Millennial	2520	NA
## 2340	m	C	F	Millennial	2520	NA
## 2341	n	A	M	Boomer	2520	NA
## 2342	n	A	M	Boomer	2520	NA
## 2343	n	A	M	Boomer	2520	NA
## 2344	n	A	M	Boomer	2520	NA
## 2345	n	A	M	Boomer	2520	NA
## 2346	n	A	M	Boomer	2520	NA
## 2347	n	A	M	Boomer	2520	NA
## 2348	n	A	M	Boomer	2520	NA
## 2349	n	A	M	Boomer	2520	NA
## 2350	n	A	M	Boomer	2520	NA
## 2351	n	A	M	GenX	2520	NA
## 2352	n	A	M	GenX	2520	NA
## 2353	n	A	M	GenX	2520	NA
## 2354	n	A	M	GenX	2520	NA
## 2355	n	A	M	GenX	2520	NA
## 2356	n	A	M	GenX	2520	NA
## 2357	n	A	M	GenX	2520	NA
## 2358	n	A	M	GenX	2520	NA
## 2359	n	A	M	GenX	2520	NA
## 2360	n	A	M	GenX	2520	NA
## 2361	n	A	M	Millennial	2520	NA
## 2362	n	A	M	Millennial	2520	NA
## 2363	n	A	M	Millennial	2520	NA
## 2364	n	A	M	Millennial	2520	NA
## 2365	n	A	M	Millennial	2520	NA
## 2366	n	A	M	Millennial	2520	NA
## 2367	n	A	M	Millennial	2520	NA
## 2368	n	A	M	Millennial	2520	NA
## 2369	n	A	M	Millennial	2520	NA
## 2370	n	A	M	Millennial	2520	NA
## 2371	n	A	F	Boomer	2520	NA
## 2372	n	A	F	Boomer	2520	NA
## 2373	n	A	F	Boomer	2520	NA
## 2374	n	A	F	Boomer	2520	NA
## 2375	n	A	F	Boomer	2520	NA
## 2376	n	A	F	Boomer	2520	NA
## 2377	n	A	F	Boomer	2520	NA
## 2378	n	A	F	Boomer	2520	NA
## 2379	n	A	F	Boomer	2520	NA
## 2380	n	A	F	Boomer	2520	NA



## 2381	n	A	F	GenX	2520	NA
## 2382	n	A	F	GenX	2520	NA
## 2383	n	A	F	GenX	2520	NA
## 2384	n	A	F	GenX	2520	NA
## 2385	n	A	F	GenX	2520	NA
## 2386	n	A	F	GenX	2520	NA
## 2387	n	A	F	GenX	2520	NA
## 2388	n	A	F	GenX	2520	NA
## 2389	n	A	F	GenX	2520	NA
## 2390	n	A	F	GenX	2520	NA
## 2391	n	A	F	Millenial	2520	NA
## 2392	n	A	F	Millenial	2520	NA
## 2393	n	A	F	Millenial	2520	NA
## 2394	n	A	F	Millenial	2520	NA
## 2395	n	A	F	Millenial	2520	NA
## 2396	n	A	F	Millenial	2520	NA
## 2397	n	A	F	Millenial	2520	NA
## 2398	n	A	F	Millenial	2520	NA
## 2399	n	A	F	Millenial	2520	NA
## 2400	n	A	F	Millenial	2520	NA
## 2401	n	B	M	Boomer	2520	NA
## 2402	n	B	M	Boomer	2520	NA
## 2403	n	B	M	Boomer	2520	NA
## 2404	n	B	M	Boomer	2520	NA
## 2405	n	B	M	Boomer	2520	NA
## 2406	n	B	M	Boomer	2520	NA
## 2407	n	B	M	Boomer	2520	NA
## 2408	n	B	M	Boomer	2520	NA
## 2409	n	B	M	Boomer	2520	NA
## 2410	n	B	M	Boomer	2520	NA
## 2411	n	B	M	GenX	2520	NA
## 2412	n	B	M	GenX	2520	NA
## 2413	n	B	M	GenX	2520	NA
## 2414	n	B	M	GenX	2520	NA
## 2415	n	B	M	GenX	2520	NA
## 2416	n	B	M	GenX	2520	NA
## 2417	n	B	M	GenX	2520	NA
## 2418	n	B	M	GenX	2520	NA
## 2419	n	B	M	GenX	2520	NA
## 2420	n	B	M	GenX	2520	NA
## 2421	n	B	M	Millenial	2520	NA
## 2422	n	B	M	Millenial	2520	NA
## 2423	n	B	M	Millenial	2520	NA
## 2424	n	B	M	Millenial	2520	NA
## 2425	n	B	M	Millenial	2520	NA
## 2426	n	B	M	Millenial	2520	NA
## 2427	n	B	M	Millenial	2520	NA
## 2428	n	B	M	Millenial	2520	NA
## 2429	n	B	M	Millenial	2520	NA
## 2430	n	B	M	Millenial	2520	NA
## 2431	n	B	F	Boomer	2520	NA
## 2432	n	B	F	Boomer	2520	NA
## 2433	n	B	F	Boomer	2520	NA
## 2434	n	B	F	Boomer	2520	NA

## 2435	n	B	F	Boomer	2520	NA
## 2436	n	B	F	Boomer	2520	NA
## 2437	n	B	F	Boomer	2520	NA
## 2438	n	B	F	Boomer	2520	NA
## 2439	n	B	F	Boomer	2520	NA
## 2440	n	B	F	Boomer	2520	NA
## 2441	n	B	F	GenX	2520	NA
## 2442	n	B	F	GenX	2520	NA
## 2443	n	B	F	GenX	2520	NA
## 2444	n	B	F	GenX	2520	NA
## 2445	n	B	F	GenX	2520	NA
## 2446	n	B	F	GenX	2520	NA
## 2447	n	B	F	GenX	2520	NA
## 2448	n	B	F	GenX	2520	NA
## 2449	n	B	F	GenX	2520	NA
## 2450	n	B	F	GenX	2520	NA
## 2451	n	B	F	Millenial	2520	NA
## 2452	n	B	F	Millenial	2520	NA
## 2453	n	B	F	Millenial	2520	NA
## 2454	n	B	F	Millenial	2520	NA
## 2455	n	B	F	Millenial	2520	NA
## 2456	n	B	F	Millenial	2520	NA
## 2457	n	B	F	Millenial	2520	NA
## 2458	n	B	F	Millenial	2520	NA
## 2459	n	B	F	Millenial	2520	NA
## 2460	n	B	F	Millenial	2520	NA
## 2461	n	C	M	Boomer	2520	NA
## 2462	n	C	M	Boomer	2520	NA
## 2463	n	C	M	Boomer	2520	NA
## 2464	n	C	M	Boomer	2520	NA
## 2465	n	C	M	Boomer	2520	NA
## 2466	n	C	M	Boomer	2520	NA
## 2467	n	C	M	Boomer	2520	NA
## 2468	n	C	M	Boomer	2520	NA
## 2469	n	C	M	Boomer	2520	NA
## 2470	n	C	M	Boomer	2520	NA
## 2471	n	C	M	GenX	2520	NA
## 2472	n	C	M	GenX	2520	NA
## 2473	n	C	M	GenX	2520	NA
## 2474	n	C	M	GenX	2520	NA
## 2475	n	C	M	GenX	2520	NA
## 2476	n	C	M	GenX	2520	NA
## 2477	n	C	M	GenX	2520	NA
## 2478	n	C	M	GenX	2520	NA
## 2479	n	C	M	GenX	2520	NA
## 2480	n	C	M	GenX	2520	NA
## 2481	n	C	M	Millenial	2520	NA
## 2482	n	C	M	Millenial	2520	NA
## 2483	n	C	M	Millenial	2520	NA
## 2484	n	C	M	Millenial	2520	NA
## 2485	n	C	M	Millenial	2520	NA
## 2486	n	C	M	Millenial	2520	NA
## 2487	n	C	M	Millenial	2520	NA
## 2488	n	C	M	Millenial	2520	NA

```
## 2489      n      C      M Millennial 2520 NA
## 2490      n      C      M Millennial 2520 NA
## 2491      n      C      F      Boomer 2520 NA
## 2492      n      C      F      Boomer 2520 NA
## 2493      n      C      F      Boomer 2520 NA
## 2494      n      C      F      Boomer 2520 NA
## 2495      n      C      F      Boomer 2520 NA
## 2496      n      C      F      Boomer 2520 NA
## 2497      n      C      F      Boomer 2520 NA
## 2498      n      C      F      Boomer 2520 NA
## 2499      n      C      F      Boomer 2520 NA
## 2500      n      C      F      Boomer 2520 NA
## 2501      n      C      F      GenX 2520 NA
## 2502      n      C      F      GenX 2520 NA
## 2503      n      C      F      GenX 2520 NA
## 2504      n      C      F      GenX 2520 NA
## 2505      n      C      F      GenX 2520 NA
## 2506      n      C      F      GenX 2520 NA
## 2507      n      C      F      GenX 2520 NA
## 2508      n      C      F      GenX 2520 NA
## 2509      n      C      F      GenX 2520 NA
## 2510      n      C      F      GenX 2520 NA
## 2511      n      C      F Millennial 2520 NA
## 2512      n      C      F Millennial 2520 NA
## 2513      n      C      F Millennial 2520 NA
## 2514      n      C      F Millennial 2520 NA
## 2515      n      C      F Millennial 2520 NA
## 2516      n      C      F Millennial 2520 NA
## 2517      n      C      F Millennial 2520 NA
## 2518      n      C      F Millennial 2520 NA
## 2519      n      C      F Millennial 2520 NA
## 2520      n      C      F Millennial 2520 NA
```

```
#X = data.frame(treatment = rep...,
#T0-D0
```

## Packages

Install the package `pacman` using regular base R.

```
{r: eval= FALSE} 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)
```

- 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 : 100)
```

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 using the following code:

```
{r:eval= FALSE} v = 1:100 expect_equal(my_reverse(v), rev(v)) expect_equal(my_reverse(c("A",  
"B", "C")), c("C", "B", "A"))
```

## 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 in English.

```
data(iris)  
pacman::p_load(skimr)  
skim(iris)
```

Table 1: 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	

TO-DO: describe this data

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[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.integer(iris$Species == "versicolor")
```

- Write a function `mode` returning the sample mode of a vector of numeric values. Try not to look in the class notes.

```
mode = function(v){
  names(sort(table(v), decreasing=TRUE)[1])
}
mode(sample(letters, 1000, replace = TRUE))
```

```
## [1] "l"
```

```
mode(y)
```

```
## [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`.

```
n = nrow(iris)
num_errors_by_parameter = matrix(NA, nrow = n, ncol = 2)
colnames(num_errors_by_parameter) = c("threshold_param", "num_errors")
for (i in 1:n){
  threshold = iris$Sepal.Length[i]
  num_errors = sum((iris$Sepal.Length[i]) != y)
  num_errors_by_parameter[i, ] = c(threshold, num_errors)
}
num_errors_by_parameter[order(num_errors_by_parameter[, "num_errors"]), ]
```

```
##      threshold_param num_errors
## [1,]           5.1         100
## [2,]           4.9         100
## [3,]           4.7         100
## [4,]           4.6         100
## [5,]           5.0         100
## [6,]           5.4         100
## [7,]           4.6         100
## [8,]           5.0         100
## [9,]           4.4         100
## [10,]          4.9         100
## [11,]          5.4         100
## [12,]          4.8         100
## [13,]          4.8         100
## [14,]          4.3         100
## [15,]          5.8         100
## [16,]          5.7         100
## [17,]          5.4         100
## [18,]          5.1         100
## [19,]          5.7         100
## [20,]          5.1         100
## [21,]          5.4         100
## [22,]          5.1         100
## [23,]          4.6         100
## [24,]          5.1         100
## [25,]          4.8         100
## [26,]          5.0         100
## [27,]          5.0         100
## [28,]          5.2         100
## [29,]          5.2         100
```

##	[30,]	4.7	100
##	[31,]	4.8	100
##	[32,]	5.4	100
##	[33,]	5.2	100
##	[34,]	5.5	100
##	[35,]	4.9	100
##	[36,]	5.0	100
##	[37,]	5.5	100
##	[38,]	4.9	100
##	[39,]	4.4	100
##	[40,]	5.1	100
##	[41,]	5.0	100
##	[42,]	4.5	100
##	[43,]	4.4	100
##	[44,]	5.0	100
##	[45,]	5.1	100
##	[46,]	4.8	100
##	[47,]	5.1	100
##	[48,]	4.6	100
##	[49,]	5.3	100
##	[50,]	5.0	100
##	[51,]	7.0	100
##	[52,]	6.4	100
##	[53,]	6.9	100
##	[54,]	5.5	100
##	[55,]	6.5	100
##	[56,]	5.7	100
##	[57,]	6.3	100
##	[58,]	4.9	100
##	[59,]	6.6	100
##	[60,]	5.2	100
##	[61,]	5.0	100
##	[62,]	5.9	100
##	[63,]	6.0	100
##	[64,]	6.1	100
##	[65,]	5.6	100
##	[66,]	6.7	100
##	[67,]	5.6	100
##	[68,]	5.8	100
##	[69,]	6.2	100
##	[70,]	5.6	100
##	[71,]	5.9	100
##	[72,]	6.1	100
##	[73,]	6.3	100
##	[74,]	6.1	100
##	[75,]	6.4	100
##	[76,]	6.6	100
##	[77,]	6.8	100
##	[78,]	6.7	100
##	[79,]	6.0	100
##	[80,]	5.7	100
##	[81,]	5.5	100
##	[82,]	5.5	100
##	[83,]	5.8	100

```
## [84,]          6.0          100
## [85,]          5.4          100
## [86,]          6.0          100
## [87,]          6.7          100
## [88,]          6.3          100
## [89,]          5.6          100
## [90,]          5.5          100
## [91,]          5.5          100
## [92,]          6.1          100
## [93,]          5.8          100
## [94,]          5.0          100
## [95,]          5.6          100
## [96,]          5.7          100
## [97,]          5.7          100
## [98,]          6.2          100
## [99,]          5.1          100
## [100,]         5.7          100
```

What is the total number of errors this model makes?

```
for(i in 1:n) {
  threshold = iris$Sepal.Length[i]
  num_errors[i] = sum((iris$Sepal.Length>threshold) !=y)
}
sum(num_errors)
```

```
## [1] 2796
```

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

```
threshold
```

```
## [1] 5.7
```

```
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
```

TO-DO: Write your answer here in English. The performance of the threshold model does make sense here, as it seems to make less error for the values that get closer and closer to the mean of the sepal length.

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
##
```

```

#' TO-DO: Explain what this function does in a few sentences
#'
#' @param Xinput      a matrix of size n by p that shows the observed features
#' @param y_binary    a binary vector of outputs
#' @param MAX_ITER    maximum iteration that you set an algorithm to run for
#' @param w            layers of the input
#'
#' @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){
  Xinput = as.matrix(cbind(1,Xinput))
  p = ncol(Xinput)
  w = rep(0,p)
  for(iter in 1 : MAX_ITER){
    for(i in 1 : nrow(Xinput)){
      x_i = Xinput[i, ]
      yhat_i = ifelse(sum(x_i * w) > 0 , 1, 0)
      y_i = y_binary[i]
      for(j in 1:p){
        w[j] = w[j] + (y_i - yhat_i) * x_i[j]
      }
    }
  }
  w
}

```

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 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.

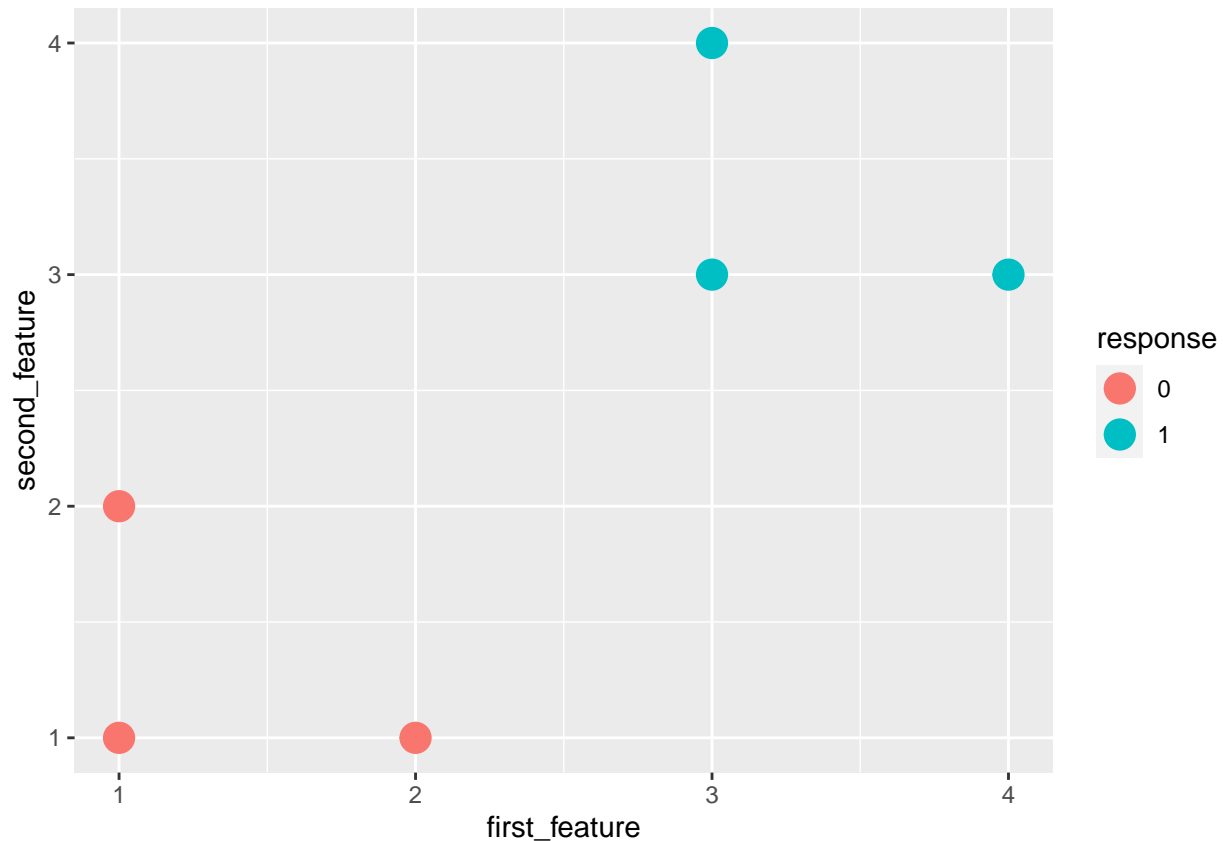
Let’s first plot y by the two features so the coordinate plane will be the two features and we use different colors to represent the third dimension, y.

```

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. This picture plots a binary response based on the two input features.

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

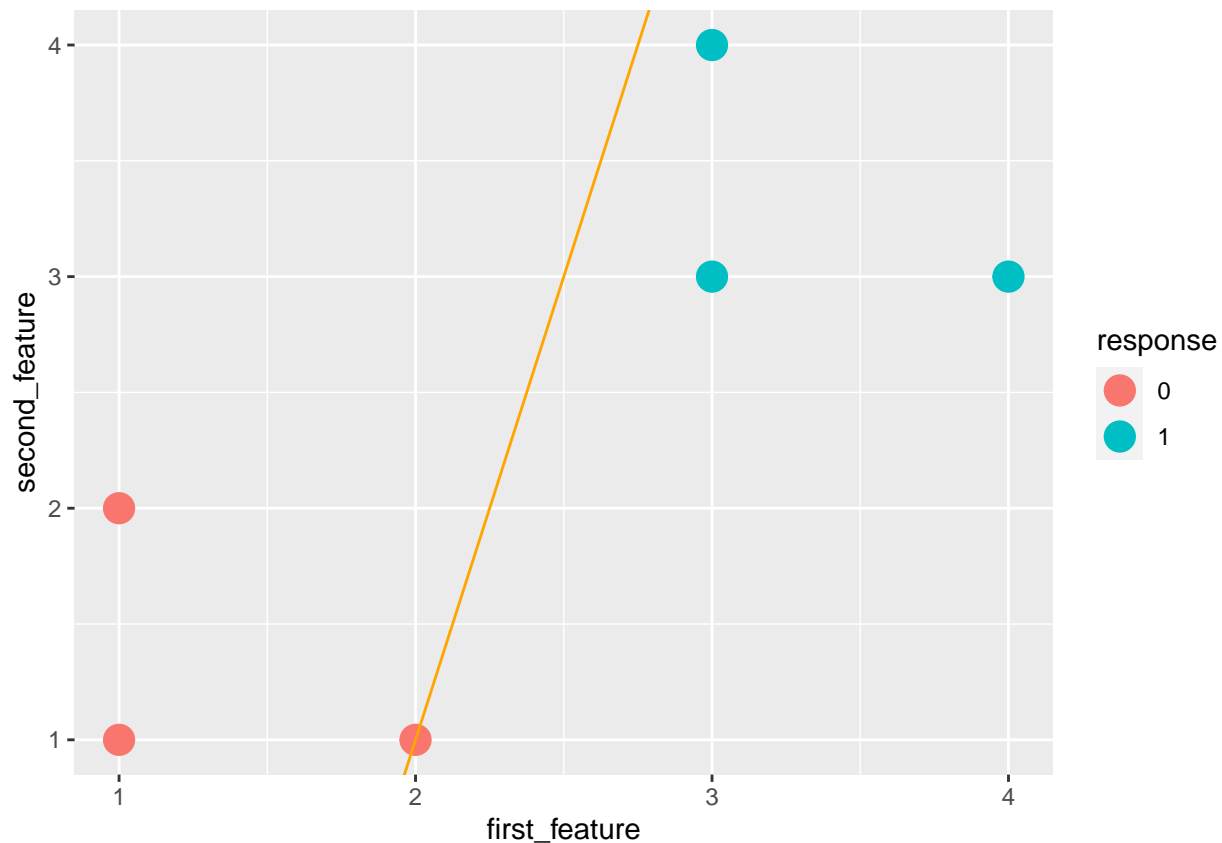
```
w_vec_simple_per = perceptron_learning_algorithm(
  cbind(Xy_simple$first_feature, Xy_simple$second_feature),
  as.numeric(Xy_simple$response == 1))
w_vec_simple_per
```

```
## [1] -7  4 -1
```

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: The -7 represents  $w_0$  and also the y-intercept of the line. 4 represents  $w_1$  and is the coefficient of  $x_1$ . -1 represents  $w_2$  and is the coefficient of  $x_2$ .

```
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: In this picture there is a line attempting to separate between the binary outputs of zeroes and ones. The line is not satisfactory, however, because the best possible line should divide the wedge between the two outputs evenly.

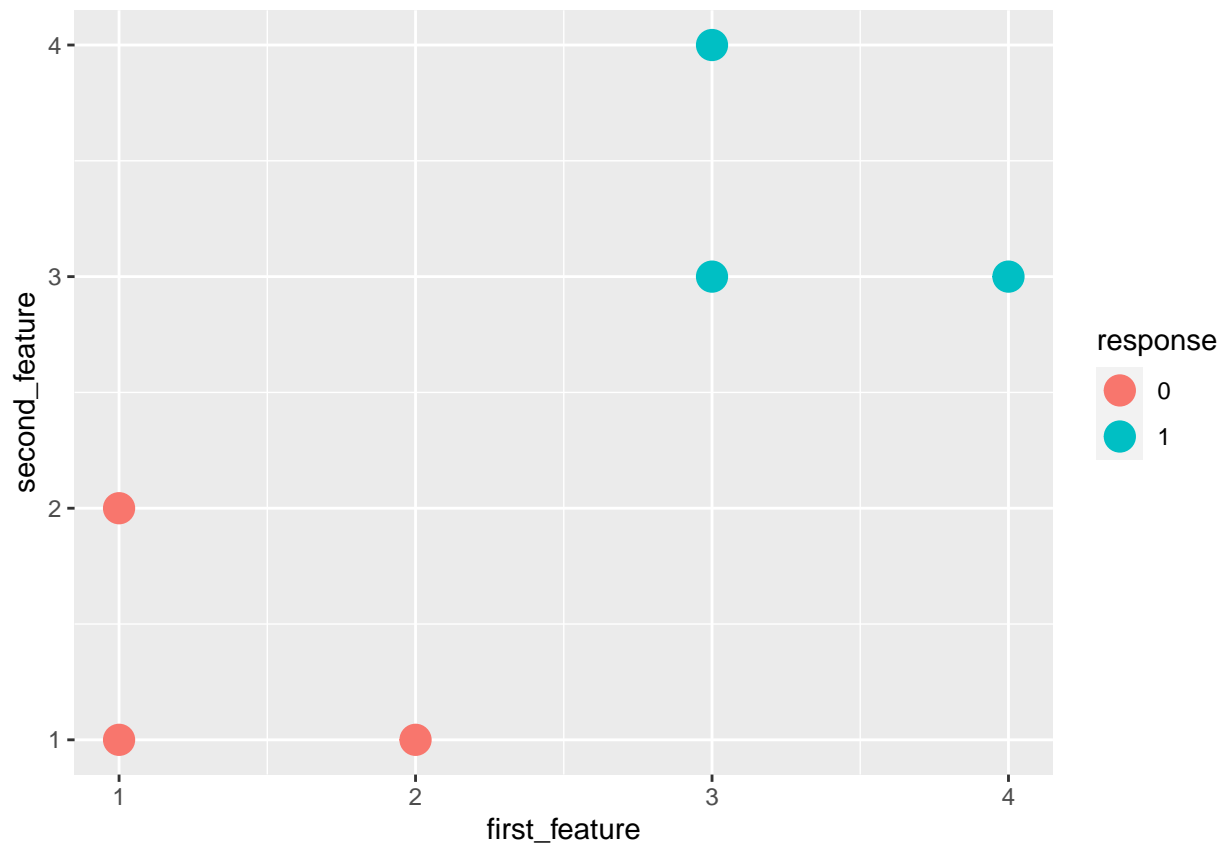
For extra credit, program the maximum-margin hyperplane perceptron that provides the best linear discrimination model for linearly separable data. Make sure you provide ROxygen documentation for this function.

*#TO-DO*

## Support Vector Machine vs. Perceptron

We recreate the data from the previous lab and visualize it:

```
pacman::p_load(ggplot2)
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
)
simple_viz_obj = ggplot(Xy_simple, aes(x = first_feature, y = second_feature, color = response)) +
  geom_point(size = 5)
simple_viz_obj
```

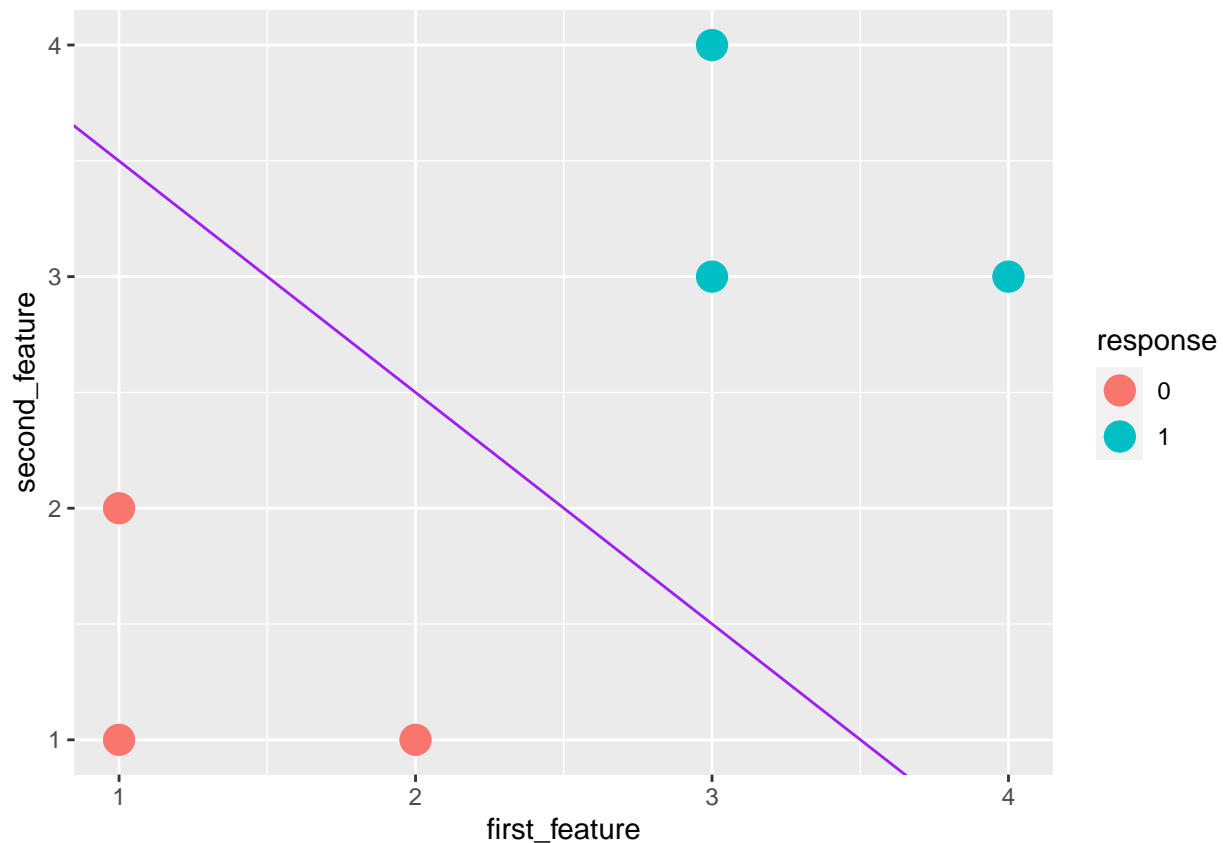


Use the `e1071` package to fit an SVM model to the simple data. Use a formula to create the model, pass in the data frame, set kernel to be `linear` for the linear SVM and don't scale the covariates. Call the model object `svm_model`. Otherwise the remaining code won't work.

```
pacman::p_load(e1071)
svm_model = svm(
  formula = Xy_simple$response ~.,
  data = Xy_simple,
  kernel = "linear",
  scale = FALSE
)
```

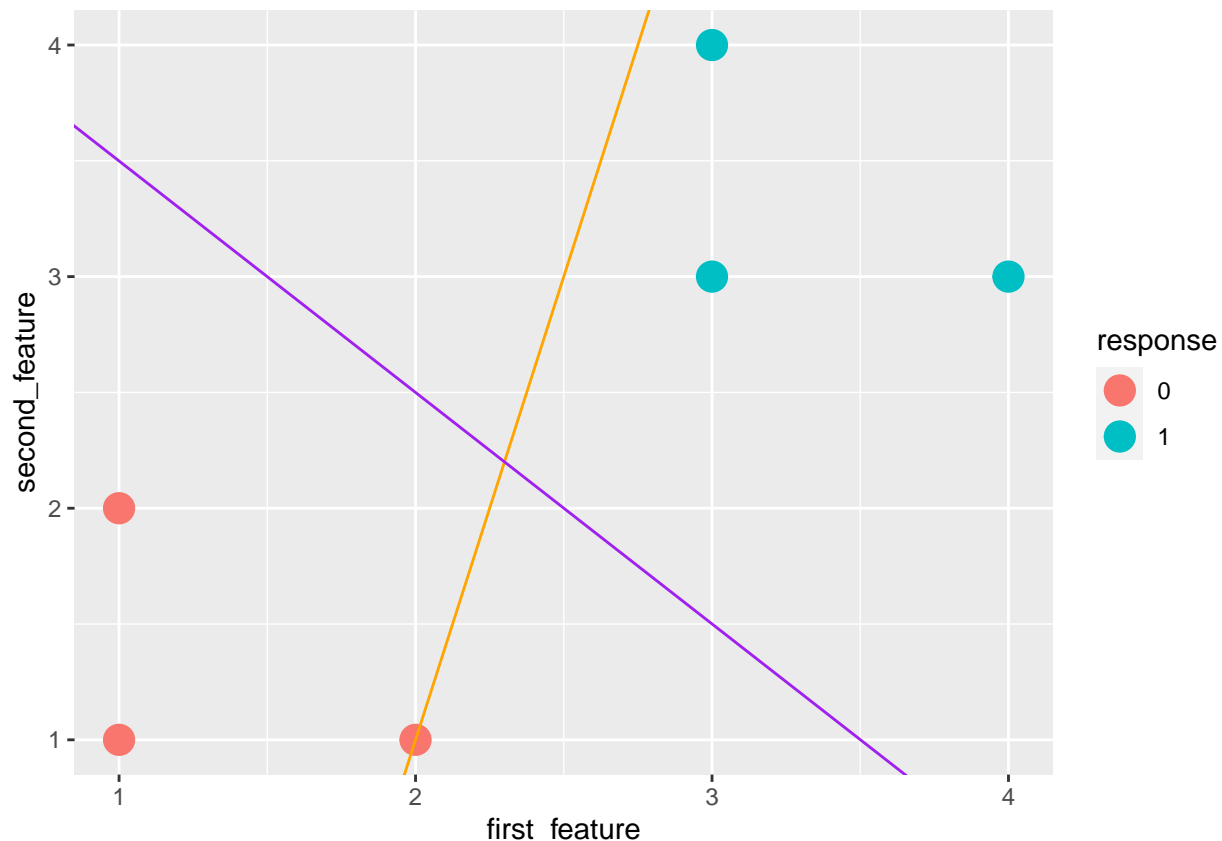
and then use the following code to visualize the line in purple:

```
w_vec_simple_svm = c(
  svm_model$rho, #the b term
  -t(svm_model$coefs) %*% cbind(Xy_simple$first_feature, Xy_simple$second_feature)[svm_model$index, ] #
)
simple_svm_line = geom_abline(
  intercept = -w_vec_simple_svm[1] / w_vec_simple_svm[3],
  slope = -w_vec_simple_svm[2] / w_vec_simple_svm[3],
  color = "purple"
)
simple_viz_obj + simple_svm_line
```



Source the `perceptron_learning_algorithm` function from lab 2. Then run the following to fit the perceptron and plot its line in orange with the SVM's line:

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



Is this SVM line a better fit than the perceptron?

TO-DO

Now write pseudocode for your own implementation of the linear support vector machine algorithm using the Vapnik objective function we discussed.

Note there are differences between this spec and the perceptron learning algorithm spec in question #1. You should figure out a way to respect the `MAX_ITER` argument value.

```
## Support Vector Machine
#
## This function implements the hinge-loss + maximum margin linear support vector machine algorithm of
##
## @param Xinput      The training data features as an n x p matrix.
## @param y_binary    The training data responses as a vector of length n consisting of only 0's and 1's
## @param MAX_ITER    The maximum number of iterations the algorithm performs. Defaults to 5000.
## @param lambda      A scalar hyperparameter trading off margin of the hyperplane versus average hinge
##                    The default value is 1.
## @return            The computed final parameter (weight) as a vector of length p + 1
linear_svm_learning_algorithm = function(Xinput, y_binary, MAX_ITER = 5000, lambda = 0.1){
  ## TO-DO: write pseudo code in comments
}
```

If you are enrolled in 342W the following is extra credit but if you're enrolled in a masters section, the following is required. Write the actual code. You may want to take a look at the `optimx` package. You can feel free to define another function (a "private" function) in this chunk if you wish. R has a way to create public and private functions, but I believe you need to create a package to do that (beyond the scope of this course).

```

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#'                    The default value is 1.
#' @return            The computed final parameter (weight) as a vector of length p + 1
linear_svm_learning_algorithm = function(Xinput, y_binary, MAX_ITER = 5000, lambda = 0.1){
  #TO-DO
}

```

If you wrote code (the extra credit), run your function using the defaults and plot it in brown vis-a-vis the previous model's line:

```

{r: eval = FALSE} svm_model_weights = linear_svm_learning_algorithm(X_simple_feature_matrix,
y_binary) my_svm_line = geom_abline(intercept = svm_model_weights[1] / svm_model_weights[3], #NOTE:
negative sign removed from intercept argument here slope = -svm_model_weights[2] /
svm_model_weights[3], color = "brown") simple_viz_obj + my_svm_line

```

Is this the same as what the e1071 implementation returned? Why or why not?

TO-DO

## Multinomial Classification using KNN

Write a  $k = 1$  nearest neighbor algorithm using the Euclidean distance function. The following comments are 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: Prediction Based on One Nearest Neighbor
#'
#' TO-DO: Explain what this function does in a few sentences
#' This function will take data and make a prediction about the output for that data based off of one n
#' @param Xinput      an n by p matrix of training data
#' @param y_binary    a binary vector of outputs of the input features
#' @param Xtest       a test observation as a row vector
#' @return            the predicted label for the test observation
nn_algorithm_predict = function(Xinput, y_binary, Xtest){
  yhat = array(NA, nrow(Xtest))
  for(istar in 1:nrow(Xtest)){
    yhat[istar] = y_binary[which.min(rowSums(t(t(Xinput) - Xtest[istar,])^2))]
  }
  yhat
}

```

Write a few tests to ensure it actually works:

```

nn_algorithm_predict = function(Xinput, y_binary, Xtest, d= NULL){
  if(is.null(d)){
    d = function(xj, xstar){
      sum((xj - xstar)^2)
    }
  }
  yhat = array(NA, nrow(Xtest))
}

```

```

for(istar in 1:nrow(Xtest)){
  dists = array(NA, nrow(Xinput))
  for (i in 1 : nrow(Xinput)){
    dists[i] = d(Xinput[i, ], Xstar[istar,])
  }
  yhat[istar] = y_binary[which.min(dists)]
}
yhat
}

```

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.

```

nn_algorithm_predict = function(Xinput, y_binary, xtest, d=function(v1,v2){sum((v1-v2)^2)}){
  n=nrow(Xinput)
  distances=array(NA,n)
  for(i in 1:n){
    distances[i]=d(Xinput[i,], xtest)
  }
  y_binary[which.min(distances)]
}

```

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 `yhat` randomly. Set the default `k` to be the square root of the size of `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*