558 Project 1

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Load in necessary libraries:

```
# load necessary libraries
library(tidyverse)
library(readr)
```

Read in data using read_csv():

```
# read in data
census_data <- read_csv("https://www4.stat.ncsu.edu/~online/datasets/EDU01a.csv")
```

Question 1

Select only Area_name, STCOU, and any column that ends in "D"

```
#subset to only selected columns
census_data1 <- census_data |> select(Area_name, STCOU, ends_with("D"))

#displaying first 5 rows
head(census_data1, 5)
```

```
# A tibble: 5 x 12
  Area_name     STCOU EDU010187D EDU010188D EDU010189D EDU010190D EDU010191D
  <chr>         <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
1 UNITED STATES 00000   40024299   39967624   40317775   40737600   41385442
2 ALABAMA       01000     733735     728234     730048     728252     725541
3 Autauga, AL   01001       6829       6900       6920       6847       7008
4 Baldwin, AL   01003      16417      16465      16799      17054      17479
5 Barbour, AL   01005       5071       5098       5068       5156       5173
# i 5 more variables: EDU010192D <dbl>, EDU010193D <dbl>, EDU010194D <dbl>,
#   EDU010195D <dbl>, EDU010196D <dbl>
```

Question 2

converting data into long format, where we want each Area_name entry to have only one Enrollment value with its own unique ID

```
#pivot data longer variables that end with "D", their values to
#Enrollment_total, names to EnrollmentID
census_long <- census_data1 |> pivot_longer(cols = ends_with("D"),
            names_to = "EnrollmentID",
           values_to = "Enrollment_Total")

#displaying first 5 rows
head(census_long,5)
```

```
# A tibble: 5 x 4
  Area_name     STCOU EnrollmentID Enrollment_Total
  <chr>         <chr> <chr>                   <dbl>
1 UNITED STATES 00000 EDU010187D           40024299
2 UNITED STATES 00000 EDU010188D           39967624
3 UNITED STATES 00000 EDU010189D           40317775
4 UNITED STATES 00000 EDU010190D           40737600
5 UNITED STATES 00000 EDU010191D           41385442
```

Question 3

```
long_updated <- census_long |>
  #pull out the year and convert the year into a numeric
  mutate( Year = as.numeric(substr(EnrollmentID, start = 8, stop = 9))) |>
   #no dates above 1996
  mutate(Year = Year + 1900) |>
  #creating new variable for identifying which measurement was grabbed
  mutate(Measurement = substr(EnrollmentID, start = 1, stop = 7) )

#displaying first 5 rows
head(long_updated, 5)
```

```
# A tibble: 5 x 6
  Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement
  <chr>         <chr> <chr>                   <dbl> <dbl> <chr>
1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101
```

```
2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101
3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101
4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101
5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101
```

Question 4

```
#County Dataset
row_names <- rownames(long_updated)
#using grep to subset the original data for county
county_subset <- row_names %in% grep(pattern = ", \\w\\w", long_updated$Area_name)
county_tibble <- subset(long_updated, county_subset)
class(county_tibble) <- c("county", class(county_tibble)) #changing class
head(county_tibble, 10)
```

```
# A tibble: 10 x 6
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101
```

```
#State Dataset
state_tibble <- subset(long_updated, !(row_names %in% grep(pattern = ", \\w\\w",
long_updated$Area_name)))
# state is what is not included in the grep for county
class(state_tibble) <- c("state", class(state_tibble))
#changing class
head(state_tibble, 10)
```

```
# A tibble: 10 x 6
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>
```

```
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101
```

Question 5

```r
#use mutate to create a new variable for state abbreviation
county_tibble1 <- county_tibble |> mutate(State = substr(county_tibble$Area_name,
start = nchar(Area_name)-1, stop = nchar(Area_name)))
#nchar allows for differing name lengths

county_tibble1
```

```
# A tibble: 31,450 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 31,440 more rows
```

Question 6

Use case_when logic to create state tibble

```
#take our initial state_tibble and then mutate
#to add a division column
state_tibble1 <- state_tibble |> mutate(Division = case_when(
  #when these states are in area_name, assign "new england"
  #to their division column
  Area_name %in% c("CONNECTICUT", "MAINE", "MASSACHUSETTS", "NEW HAMPSHIRE",
                   "RHODE ISLAND", "VERMONT") ~ "New England",
  Area_name %in% c("NEW JERSEY", "NEW YORK", "PENNYSYLVANIA") ~ "Mid-Atlantic",

  Area_name %in% c("ILLINOIS", "INDIANIA", "MICHIGAN", "OHIO", "WISCONSIN")
  ~ "East North Central",

  Area_name %in% c("IOWA", "KANSAS", "MINNESOTA", "MISSOURI",
                   "NEBRASKA", "NORTH DAKOTA", "SOUTH DAKOTA")
  ~ "West North Central",

  Area_name %in% c("DELAWARE", "DISTRICT OF COLUMBIA", "District of Columbia",
"FLORIDA", "GEORGIA", "MARYLAND", "NORTH CAROLINA",
"SOUTH CAROLINA",

"VIRGINIA", "WEST VIRGINIA")
~ "South Atlantic",

  Area_name %in% c("ALABAMA", "KENTUCKY", "MISSISSIPPI", "TENNESSEE")
~ "East South Central",

  Area_name %in% c("ARKANSAS", "LOUISIANA", "OKLAHOMA", "TEXAS")
~"West South Central",

  Area_name %in% c("ARIZONA", "COLORADO", "IDAHO", "NEVADA",
                   "MONTANA", "NEW MEXICO", "UTAH", "WYOMING")
~ "Mountain",

  Area_name %in% c("ALASKA", "CALIFORNIA", "HAWAII", "OREGON",
                   "WASHINGTON") ~ "Pacific", .default = "ERROR"

))

state_tibble1
```

```
# A tibble: 530 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 520 more rows
```

Read in second data set

```
census_data2 <- read_csv("https://www4.stat.ncsu.edu/~online/datasets/EDU01b.csv")
```

Write Function for steps 1 and 2

```
#function with two inputs, data and values, values default is "Enrollment_Total"
step12func <- function(data, values = "Enrollment_Total") {
  #first take in a data set and subset using select()
 long_data <- data |>
   select(Area_name, STCOU, ends_with("D")) |>
   #and then pivot the data to longer
   pivot_longer(cols = ends_with("D"), names_to = "EnrollmentID", values_to = values)

return(long_data)
}
```

```
step12func(census_data2)
```

```
# A tibble: 31,980 x 4
   Area_name     STCOU EnrollmentID Enrollment_Total
   <chr>         <chr> <chr>                   <dbl>
 1 UNITED STATES 00000 EDU010197D           44534459
 2 UNITED STATES 00000 EDU010198D           46245814
 3 UNITED STATES 00000 EDU010199D           46368903
 4 UNITED STATES 00000 EDU010200D           46818690
 5 UNITED STATES 00000 EDU010201D           47127066
 6 UNITED STATES 00000 EDU010202D           47606570
 7 UNITED STATES 00000 EDU015203D           48506317
 8 UNITED STATES 00000 EDU015204D           48693287
 9 UNITED STATES 00000 EDU015205D           48978555
10 UNITED STATES 00000 EDU015206D           49140702
# i 31,970 more rows
```

Write Function for step 3

There are now years after 1999 so we have to change our year mutate function

```r
step3func <- function(long_data, values = "Enrollment_Total") {

  long_updated <- long_data |>
    #create a new column called year, using substr to detect to 8th and 9th
#characters in EnrollmentID string
    mutate(Year = as.numeric(substr(EnrollmentID, start = 8, stop = 9))) |>
    #account for years 2000 and up in our ifelse condition
    mutate(Year = ifelse(Year > 25, Year + 1900, Year + 2000)) |>
    #create a measurement column detecting the 1st through 7th
    #characters in EnrollmentID string
    mutate(Measurement = substr(EnrollmentID, start = 1, stop = 7))
  #show the new updated data set
  return(long_updated)
}
```

```r
step3func(census_long)
```

```
# A tibble: 31,980 x 6
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101
```

```
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101
# i 31,970 more rows
```

Write Function for step 5

```r
#create a function that makes a state column based on area_name
step5func <- function(tibble) {
#take in tibble and creat a state column by detecting the last two characters in Area_name.
  #do this by using nchar()-1 and nchar(). This give last two characters.
county_tibble_result <- tibble |> mutate(State = substr(tibble$Area_name,
  start = nchar(Area_name)-1, stop = nchar(Area_name)))
#show results
return(county_tibble_result)
}
```

```r
step5func(county_tibble1)
```

```
# A tibble: 31,450 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 31,440 more rows
```

Write Function for step 6

```r
step6func <- function(tibble) {
  #take in tibble and add a division column based on area names:
state_tibble1 <- tibble |> mutate(Division = case_when(
  Area_name %in% c("CONNECTICUT", "MAINE", "MASSACHUSETTS",
                   "NEW HAMPSHIRE", "RHODE ISLAND", "VERMONT")
  ~ "New England",
  Area_name %in% c("NEW JERSEY", "NEW YORK", "PENNYSYLVANIA")
  ~ "Mid-Atlantic",

  Area_name %in% c("ILLINOIS", "INDIANIA", "MICHIGAN", "OHIO",
                   "WISCONSIN") ~ "East North Central",

  Area_name %in% c("IOWA", "KANSAS", "MINNESOTA", "MISSOURI",
                   "NEBRASKA", "NORTH DAKOTA", "SOUTH DAKOTA")
  ~ "West North Central",

  Area_name %in% c("DELAWARE", "DISTRICT OF COLUMBIA",
                   "District of Columbia", "FLORIDA", "GEORGIA",
                   "MARYLAND", "NORTH CAROLINA", "SOUTH CAROLINA", "VIRGINIA",
  "WEST VIRGINIA") ~ "South Atlantic",

  Area_name %in% c("ALABAMA", "KENTUCKY", "MISSISSIPPI",
                   "TENNESSEE") ~ "East South Central",

  Area_name %in% c("ARKANSAS", "LOUISIANA", "OKLAHOMA", "TEXAS")
  ~"West South Central",

  Area_name %in% c("ARIZONA", "COLORADO", "IDAHO",
                   "NEVADA", "MONTANA", "NEW MEXICO",
                   "UTAH", "WYOMING") ~ "Mountain",

  Area_name %in% c("ALASKA", "CALIFORNIA", "HAWAII",
                   "OREGON", "WASHINGTON")
  ~ "Pacific", .default = "ERROR"

))
#show results
return(state_tibble1)
}
```

```
step6func(state_tibble)
```

```
# A tibble: 530 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
```

```
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 520 more rows
```

Write Function for steps 4,5,6

```
# create a function applying steps 4,5,6
step456func <- function(long_data, values = "Enrollment_Total") {
  #assign rownames
row_names <- rownames(long_data)
#grep and pattern to detect the State names in row names
county_subset <- row_names %in% grep(pattern = ", \\w\\w", long_data$Area_name)
#subset county data into one tibble
county_tibble <- subset(long_data, county_subset)
class(county_tibble) <- c("county", class(county_tibble))
#subset state data into one tibble
state_tibble <- subset(long_data, !(row_names %in% grep(pattern = ", \\w\\w",
                                                        long_data$Area_name)))
class(state_tibble) <- c("state", class(state_tibble))

#return both tibbles in a list
return(list(step5func(county_tibble), step6func(state_tibble)))
}
```

```
step456func(long_updated)
```

```
[[1]]
# A tibble: 31,450 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 31,440 more rows

[[2]]
# A tibble: 530 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 520 more rows
```

Wrapper function

```r
my_wrapper <- function(url, values = "Enrollment_Total") {
  #take in data from url
  result <- read_csv(url) |>
    #apply the three functions in order
    step12func() |>
     step3func() |>
      step456func()
  #show us results
  return(result)
}
```

Call It and Combine Your Data

```
#read in data
CensusA <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/EDU01a.csv",
                      values = "Enrollment_Total")
```

```
#read in data
CensusB <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/EDU01b.csv",
                      values = "Enrollment_Total")
```

```
#Combining results of the two wrapper functions
#function with three inputs
combine_function <- function(data1, data2, values = "Enrollment_Total") {
  #bind_rows from dplyr for county [[1]]
 county = dplyr::bind_rows(data1[[1]], data2[[1]])
 #bind_rows from dplyr for state [[2]]
 state = dplyr::bind_rows(data1[[2]], data2[[2]])
 #return list with two tibbles, county and state respectively
  return(list(county,state))
}
```

```
#combine_function to combine two data sets
combined_data <- combine_function(CensusA,CensusB)
combined_data
```

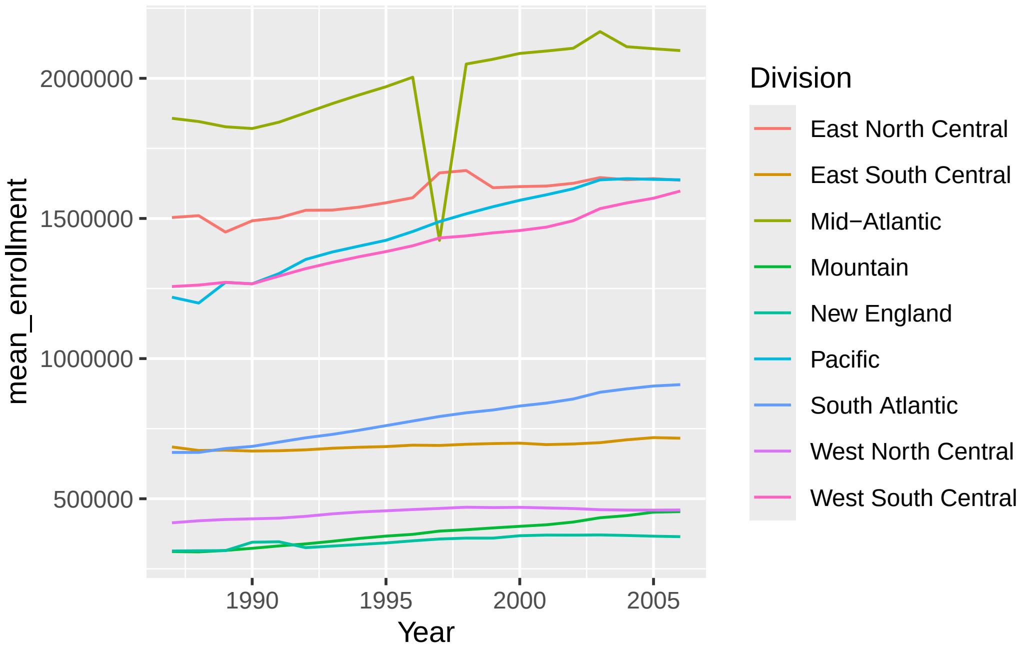
```
[[1]]
# A tibble: 62,900 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 62,890 more rows
```

```
[[2]]
# A tibble: 1,060 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 1,050 more rows
```

Writing a Generic Function for Summarizing

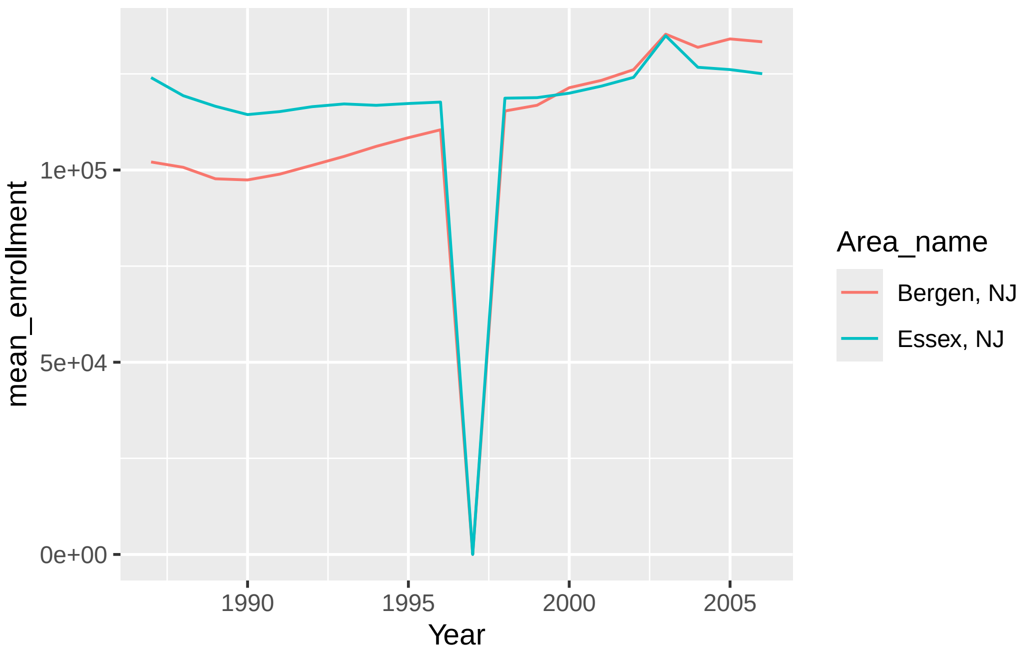
Write a function for state data that plots the mean value of Enrollment over the years for each Division.

```r
plot.state <- function(data, var_name = "Enrollment_Total"){
  data |>
    #group by division and year
  group_by(Division, Year) |>
    #get mean enrollment values for the divisions across years
  summarize(mean_enrollment = mean(get(var_name), na.rm = TRUE), .groups = "drop") |>
    #exclude divisions that are "ERROR"
  filter( Division != "ERROR") |>
  #ggplot where x axis is year and y axis are mean erollments,
    #distiguish divisions by color
    ggplot(aes(x = Year, y = mean_enrollment, color = Division)) +
    #geom_line to show trend
    geom_line() }

#call the plot for the state dataset in the combined data:
plot(combined_data[[2]])
```



Write a function to plot county data, users can: specify state (if not specified default is NJ), specify top or bottom counties (top is default), specify how many top or bottom counties to show (default is 5):

```
#plot function for county data
plot.county <- function(data, state = "NJ", type = "top", n = 5,
                        var_name = "Enrollment_Total") {
  #Filter data for just one state's counties
  data_onestate <- data |>
    filter(State == state) |>
  #Get mean enrollment values grouped by area_names
    group_by(Area_name, Year) |>
    summarize(mean_enrollment = mean(get(var_name), na.rm = TRUE), .groups = "drop")

  #Take filtered data and arrange it ascending and descending, use ifelse to specify n rows:

  select_rows <- if (type == "top") { data_onestate |>
      arrange(desc(mean_enrollment)) |>
      slice_head(n = n) } else { data_onestate |>
      arrange((mean_enrollment)) |>
      slice_head(n = n)}

#filter for where the counties names are the same as the top/bottom selected rows
plot_data <- data_onestate |>
  filter(Area_name %in% select_rows$Area_name)

#now plot the plot_data with geom_line to show trends over years
ggplot(plot_data, aes(x = Year, y = mean_enrollment, color = Area_name)) +
  geom_line()
   }

plot(combined_data[[1]])
```



Put it Together!

Run your data processing function on the two enrollment URLs given previously:

```
#apply wrapper function to data from URL a
CensusA <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/EDU01a.csv",
                      values = "Enrollment_Total")
#apply wrapper function to data from URL b
CensusB <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/EDU01b.csv",
                      values = "Enrollment_Total")
```

Run your data combining function to put these into one object:

```r
combined_data <- combine_function(CensusA,CensusB)
combined_data
```

```
[[1]]
# A tibble: 62,900 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 62,890 more rows

[[2]]
# A tibble: 1,060 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 1,050 more rows
```

```r
#County data:
combined_data[[1]]
```

```
# A tibble: 62,900 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
```

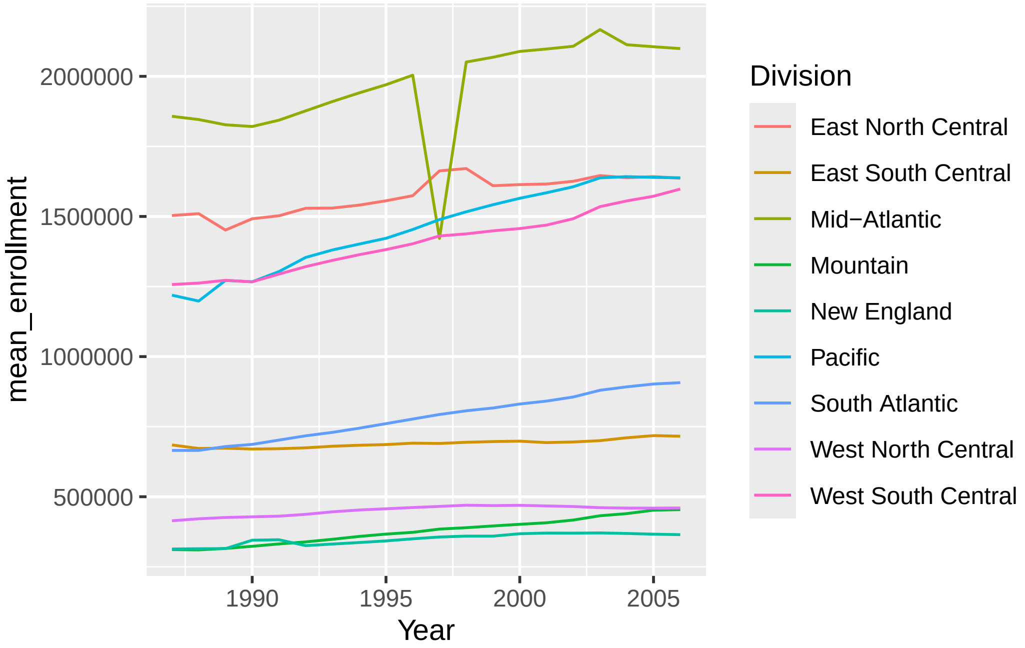
```
 1 Autauga, AL 01001 EDU010187D               6829  1987 EDU0101     AL
 2 Autauga, AL 01001 EDU010188D               6900  1988 EDU0101     AL
 3 Autauga, AL 01001 EDU010189D               6920  1989 EDU0101     AL
 4 Autauga, AL 01001 EDU010190D               6847  1990 EDU0101     AL
 5 Autauga, AL 01001 EDU010191D               7008  1991 EDU0101     AL
 6 Autauga, AL 01001 EDU010192D               7137  1992 EDU0101     AL
 7 Autauga, AL 01001 EDU010193D               7152  1993 EDU0101     AL
 8 Autauga, AL 01001 EDU010194D               7381  1994 EDU0101     AL
 9 Autauga, AL 01001 EDU010195D               7568  1995 EDU0101     AL
10 Autauga, AL 01001 EDU010196D               7834  1996 EDU0101     AL
# i 62,890 more rows
```

```
#State data
combined_data[[2]]
```

```
# A tibble: 1,060 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 EDU010187D           40024299  1987 EDU0101     ERROR
 2 UNITED STATES 00000 EDU010188D           39967624  1988 EDU0101     ERROR
 3 UNITED STATES 00000 EDU010189D           40317775  1989 EDU0101     ERROR
 4 UNITED STATES 00000 EDU010190D           40737600  1990 EDU0101     ERROR
 5 UNITED STATES 00000 EDU010191D           41385442  1991 EDU0101     ERROR
 6 UNITED STATES 00000 EDU010192D           42088151  1992 EDU0101     ERROR
 7 UNITED STATES 00000 EDU010193D           42724710  1993 EDU0101     ERROR
 8 UNITED STATES 00000 EDU010194D           43369917  1994 EDU0101     ERROR
 9 UNITED STATES 00000 EDU010195D           43993459  1995 EDU0101     ERROR
10 UNITED STATES 00000 EDU010196D           44715737  1996 EDU0101     ERROR
# i 1,050 more rows
```

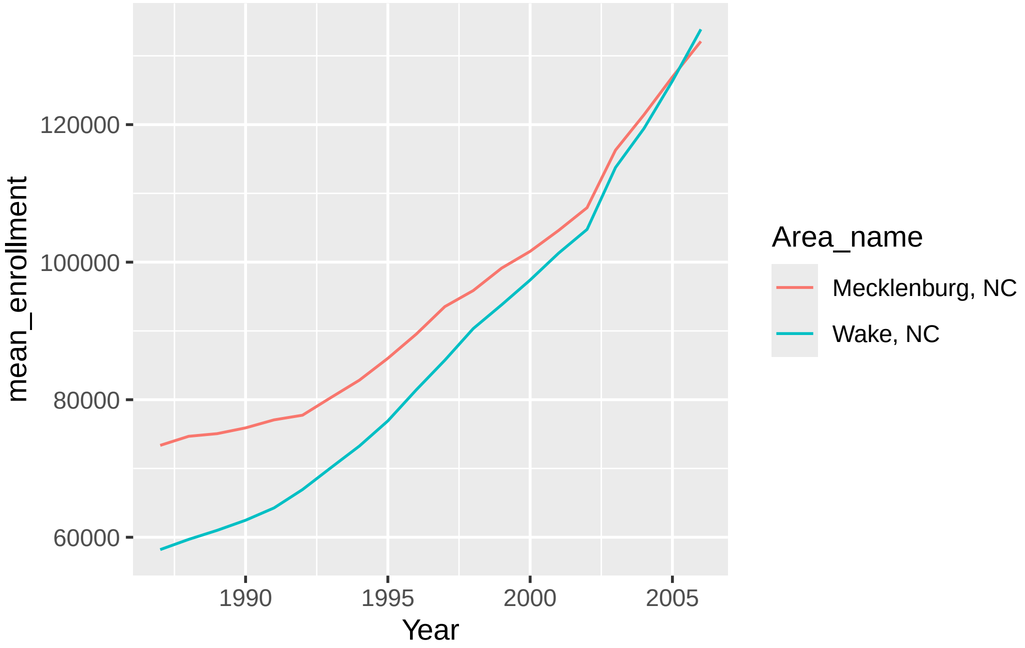
Plot State data frame:

```
plot(combined_data[[2]])
```



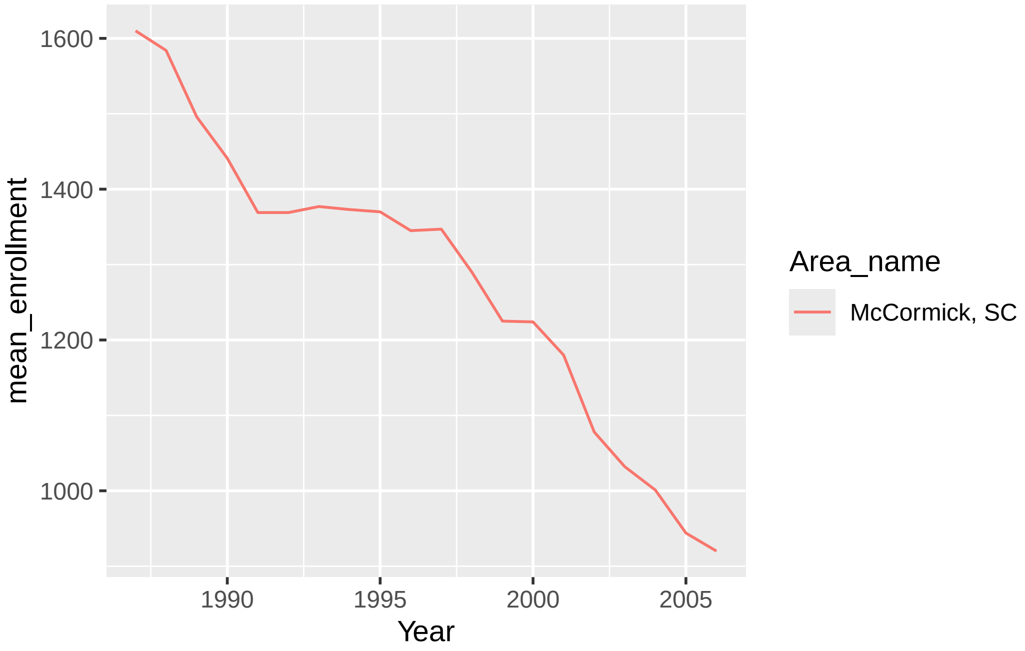
Plot County data: *specifying the state to be "NC", the group being the top, the number looked at being 20*

```
plot(combined_data[[1]], state = "NC", type = "top", n = 20)
```



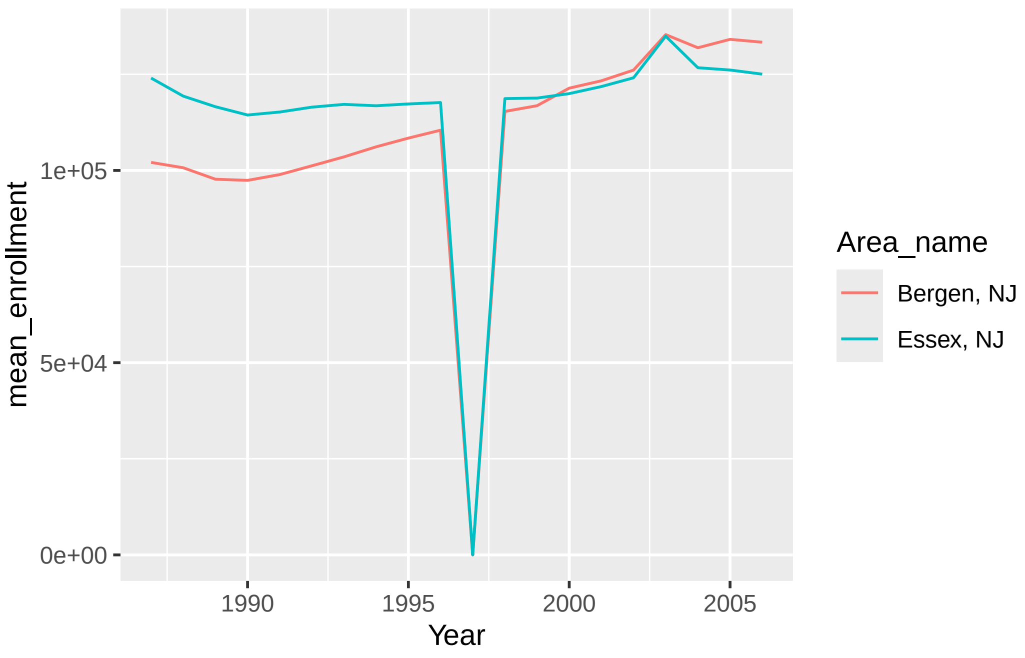
specifying the state to be "SC", the group being the bottom, the number looked at being 7

```
plot(combined_data[[1]], state = "SC", type = "bottom", n = 7)
```



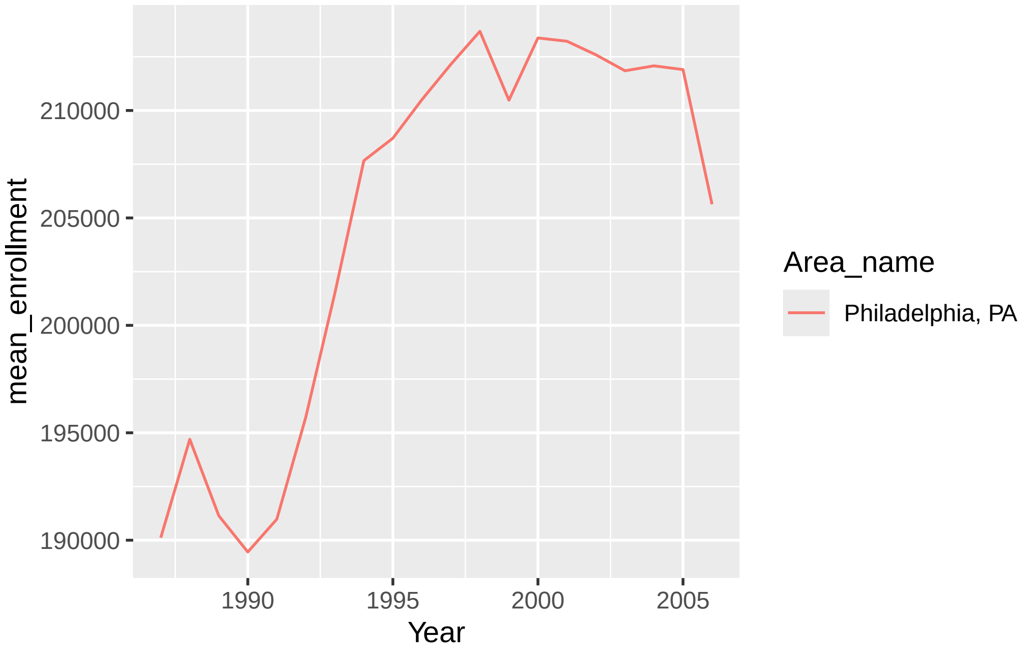
without specifying anything (defaults used)

```
plot(combined_data[[1]])
```



specifying the state to be "PA", the group being the top, the number looked at being 8

```
plot(combined_data[[1]], state = "PA", type = "top", n = 8)
```



Run your data processing function on the four data sets:

```
URL1 <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/PST01a.csv",
                   values = "Enrollment_Total")

URL2 <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/PST01b.csv",
                   values = "Enrollment_Total")

URL3 <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/PST01c.csv",
                   values = "Enrollment_Total")

URL4 <- my_wrapper(url = "https://www4.stat.ncsu.edu/~online/datasets/PST01d.csv",
                   values = "Enrollment_Total")
```

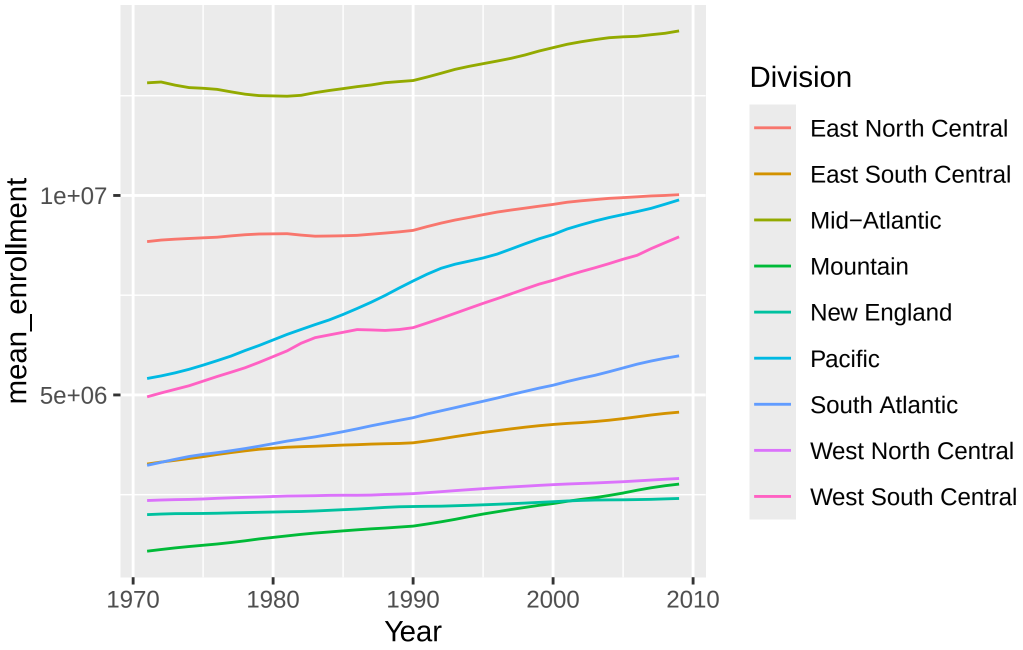
Data combining function to put these into one object:

```
combined_data12 <- combine_function(URL1,URL2)
combined_data34 <- combine_function(URL3,URL4)
combined_data1234 <- combine_function(combined_data12,combined_data34)
combined_data1234
```

```
[[1]]
# A tibble: 125,800 x 7
   Area_name   STCOU EnrollmentID Enrollment_Total  Year Measurement State
   <chr>       <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 Autauga, AL 01001 PST015171D              25508  1971 PST0151     AL
 2 Autauga, AL 01001 PST015172D              27166  1972 PST0151     AL
 3 Autauga, AL 01001 PST015173D              28463  1973 PST0151     AL
 4 Autauga, AL 01001 PST015174D              29266  1974 PST0151     AL
 5 Autauga, AL 01001 PST015175D              29718  1975 PST0151     AL
 6 Autauga, AL 01001 PST015176D              29896  1976 PST0151     AL
 7 Autauga, AL 01001 PST015177D              30462  1977 PST0151     AL
 8 Autauga, AL 01001 PST015178D              30882  1978 PST0151     AL
 9 Autauga, AL 01001 PST015179D              32055  1979 PST0151     AL
10 Autauga, AL 01001 PST025181D              31985  1981 PST0251     AL
# i 125,790 more rows

[[2]]
# A tibble: 2,120 x 7
   Area_name     STCOU EnrollmentID Enrollment_Total  Year Measurement Division
   <chr>         <chr> <chr>                   <dbl> <dbl> <chr>       <chr>
 1 UNITED STATES 00000 PST015171D          206827028  1971 PST0151     ERROR
 2 UNITED STATES 00000 PST015172D          209283904  1972 PST0151      ERROR
 3 UNITED STATES 00000 PST015173D          211357490  1973 PST0151      ERROR
 4 UNITED STATES 00000 PST015174D          213341552  1974 PST0151      ERROR
 5 UNITED STATES 00000 PST015175D          215465246  1975 PST0151      ERROR
 6 UNITED STATES 00000 PST015176D          217562728  1976 PST0151      ERROR
 7 UNITED STATES 00000 PST015177D          219759860  1977 PST0151      ERROR
 8 UNITED STATES 00000 PST015178D          222095080  1978 PST0151      ERROR
 9 UNITED STATES 00000 PST015179D          224567234  1979 PST0151      ERROR
10 UNITED STATES 00000 PST025181D          229466391  1981 PST0251      ERROR
# i 2,110 more rows
```

Use the plot function on the state data frame:

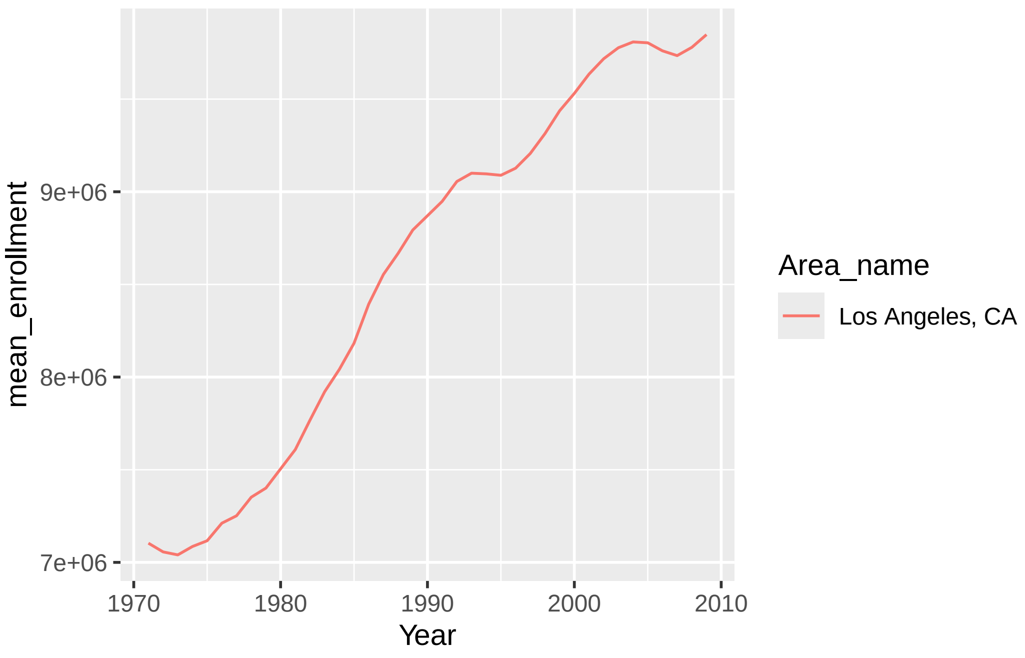
```
plot(combined_data1234[[2]])
```



Use the plot function on the county data frame:

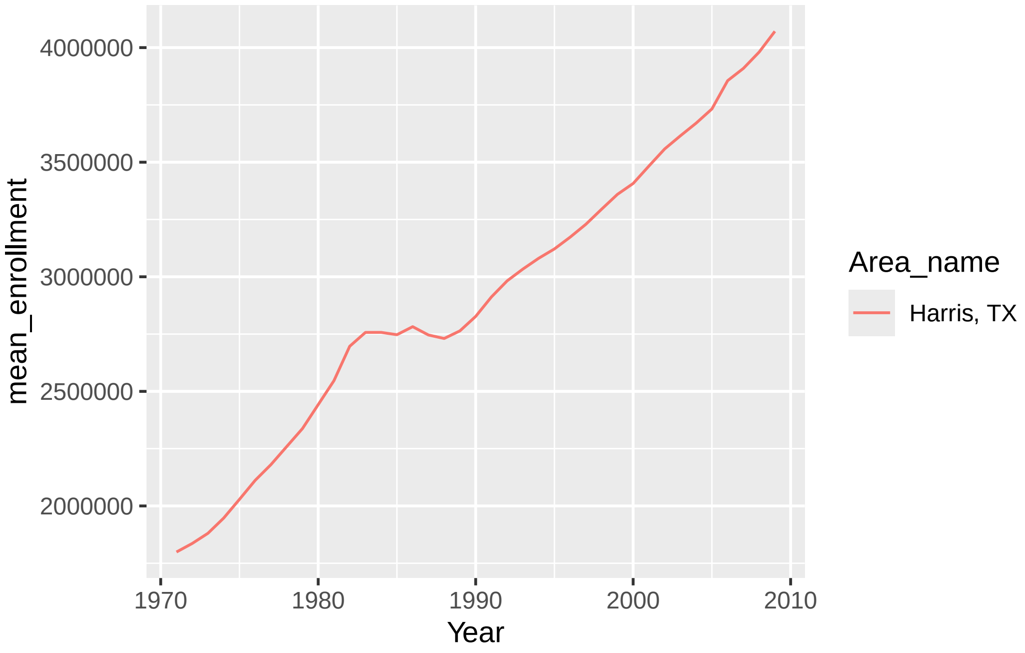
Specifying the state to be “CA”, the group being the top, the number looked at being 15:

```
plot(combined_data1234[[1]], state = "CA", type = "top", n = 15)
```



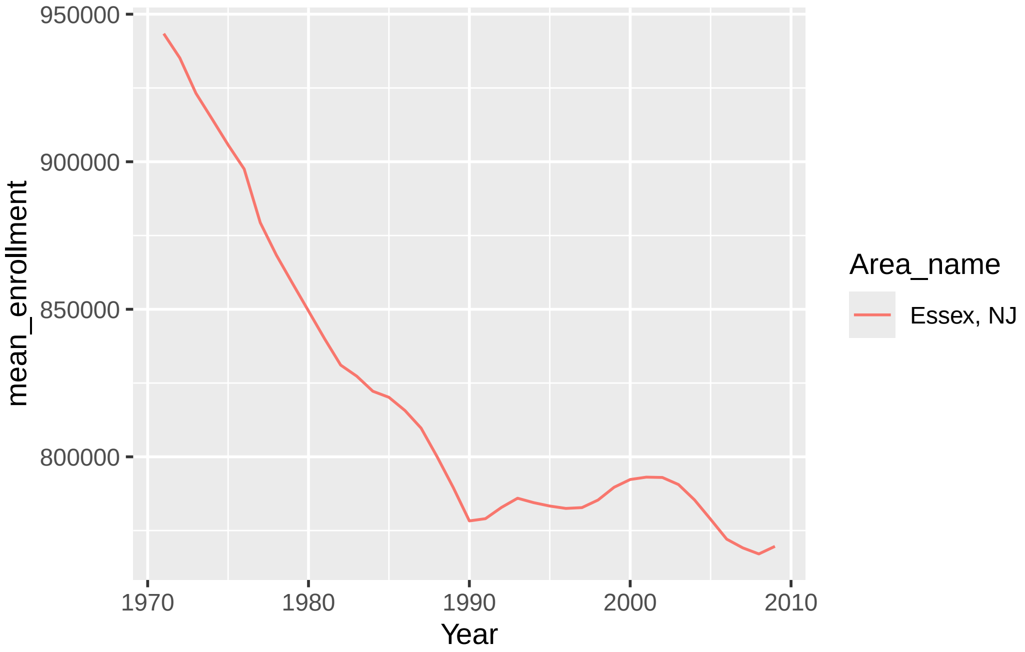
specifying the state to be "TX", the group being the top, the number looked at being 4

```
plot(combined_data1234[[1]], state = "TX", type = "top", n = 4)
```



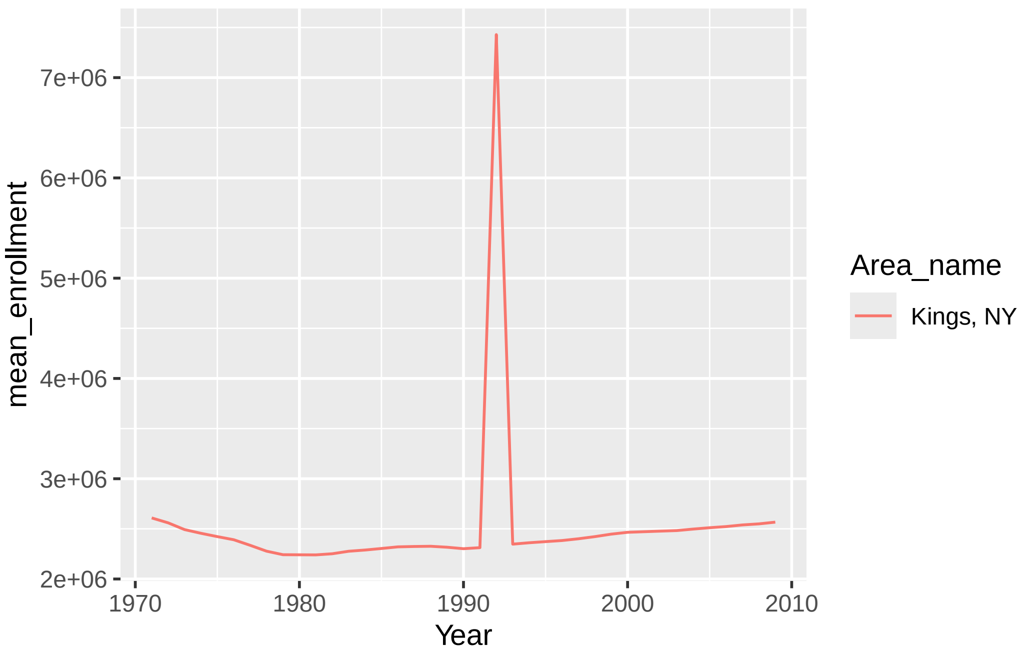
without specifying anything (defaults used)

```
plot(combined_data1234[[1]])
```



specifying the state to be "NY", the group being the top, the number looked at being 10

```
plot(combined_data1234[[1]], state = "NY", type = "top", n = 10)
```


mean_enrollment
7e+06
6e+06
5e+06
4e+06
3e+06
2e+06
1970
1980
1990
2000
2010
Year
Area_name
Kings, NY