Module-2-Project.R

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```r
r = getOption("repos")
r["CRAN"]="http://cran.us.r-project.org"
options(repos=r)


#1. Print "Plotting Basics: Lastname"
print("Plotting Basics: Mohile")
```

```
## [1] "Plotting Basics: Mohile"
```

```r
#2.installing required packages
# install.packages('FSA')
# install.packages('FSAdata')
# install.packages('magrittr')
# install.packages('dplyr')
# install.packages('plotrix')
# install.packages('ggplot2')
# install.packages('moments')
#.importing required libraries
install.packages('FSA')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)

## package 'FSA' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```r
install.packages('FSAdata')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)

## package 'FSAdata' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```
install.packages('magrittr')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
##
##   There is a binary version available but the source version is later:
##         binary source needs_compilation
## magrittr  2.0.1  2.0.2              TRUE
##
##   Binaries will be installed
## package 'magrittr' successfully unpacked and MD5 sums checked
```

```
## Warning: cannot remove prior installation of package 'magrittr'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE):
## problem copying C:\Users\mohil\OneDrive\Documents\R\win-
## library\4.1\00LOCK\magrittr\libs\x64\magrittr.dll
## to C:\Users\mohil\OneDrive\Documents\R\win-
## library\4.1\magrittr\libs\x64\magrittr.dll: Permission denied
```

```
## Warning: restored 'magrittr'
```

```
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```
install.packages('dplyr')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'dplyr' successfully unpacked and MD5 sums checked
```

```
## Warning: cannot remove prior installation of package 'dplyr'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE):
## problem copying C:\Users\mohil\OneDrive\Documents\R\win-
## library\4.1\00LOCK\dplyr\libs\x64\dplyr.dll to C:
## \Users\mohil\OneDrive\Documents\R\win-library\4.1\dplyr\libs\x64\dplyr.dll:
## Permission denied
```

```
## Warning: restored 'dplyr'
```

```
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```r
install.packages('plotrix')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'plotrix' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```r
install.packages('ggplot2')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'ggplot2' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```r
install.packages('moments')
```

```
## Installing package into 'C:/Users/mohil/OneDrive/Documents/R/win-library/4.1'
## (as 'lib' is unspecified)
```

```
## package 'moments' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\mohil\AppData\Local\Temp\RtmpADp68d\downloaded_packages
```

```r
library('FSA')
```

```
## ## FSA v0.9.1. See citation('FSA') if used in publication.
## ## Run fishR() for related website and fishR('IFAR') for related book.
```

```r
library('FSAdata')
```

```
## ## FSAdata v0.3.8. See ?FSAdata to find data for specific fisheries analyses.
```

```r
library('magrittr')
library('dplyr')
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

library('plotrix')
library('ggplot2')
library('moments')


#3.loading the data
BullTroutRML2
```

```
##    age  fl    lake     era
## 1   14 459 Harrison 1977-80
## 2   12 449 Harrison 1977-80
## 3   10 471 Harrison 1977-80
## 4   10 446 Harrison 1977-80
## 5    9 400 Harrison 1977-80
## 6    9 440 Harrison 1977-80
## 7    9 462 Harrison 1977-80
## 8    8 480 Harrison 1977-80
## 9    8 449 Harrison 1977-80
## 10   7 437 Harrison 1977-80
## 11   7 431 Harrison 1977-80
## 12   7 425 Harrison 1977-80
## 13   7 419 Harrison 1977-80
## 14   6 409 Harrison 1977-80
## 15   6 397 Harrison 1977-80
## 16   5 419 Harrison 1977-80
## 17   5 381 Harrison 1977-80
## 18   5 363 Harrison 1977-80
## 19   5 351 Harrison 1977-80
## 20   4 372 Harrison 1977-80
## 21   2 199 Harrison 1977-80
## 22   2 184 Harrison 1977-80
## 23   1  91 Harrison 1977-80
## 24  12 440 Harrison 1997-01
## 25  11 428 Harrison 1997-01
## 26  10 440 Harrison 1997-01
## 27  10 422 Harrison 1997-01
## 28   9 434 Harrison 1997-01
## 29   9 415 Harrison 1997-01
## 30   9 406 Harrison 1997-01
## 31   8 434 Harrison 1997-01
## 32   8 406 Harrison 1997-01
## 33   8 375 Harrison 1997-01
## 34   7 415 Harrison 1997-01
## 35   7 394 Harrison 1997-01
## 36   6 381 Harrison 1997-01
## 37   6 357 Harrison 1997-01
## 38   5 341 Harrison 1997-01
## 39   5 326 Harrison 1997-01
## 40   4 304 Harrison 1997-01
## 41   4 292 Harrison 1997-01
```

```
## 42   4 270 Harrison 1997-01
## 43   4 252 Harrison 1997-01
## 44   4 221 Harrison 1997-01
## 45   3 258 Harrison 1997-01
## 46   3 233 Harrison 1997-01
## 47   3 211 Harrison 1997-01
## 48   3 205 Harrison 1997-01
## 49   3 180 Harrison 1997-01
## 50   2 196 Harrison 1997-01
## 51   2 171 Harrison 1997-01
## 52   2 143 Harrison 1997-01
## 53   1 131 Harrison 1997-01
## 54   1  88 Harrison 1997-01
## 55   1  75 Harrison 1997-01
## 56   0  51 Harrison 1997-01
## 57   0  41 Harrison 1997-01
## 58   0  20 Harrison 1997-01
## 59   7 245 Harrison 1997-01
## 60   7 279 Harrison 1997-01
## 61   5 245 Harrison 1997-01
## 62   8 360   Osprey 1977-80
## 63   8 357   Osprey 1977-80
## 64   7 357   Osprey 1977-80
## 65   7 329   Osprey 1977-80
## 66   6 385   Osprey 1977-80
## 67   6 323   Osprey 1977-80
## 68   5 369   Osprey 1977-80
## 69   5 326   Osprey 1977-80
## 70   4 357   Osprey 1977-80
## 71   4 326   Osprey 1977-80
## 72   4 258   Osprey 1977-80
## 73   4 239   Osprey 1977-80
## 74   3 221   Osprey 1977-80
## 75   3 258   Osprey 1977-80
## 76   3 276   Osprey 1977-80
## 77  11 688   Osprey 1997-01
## 78  10 369   Osprey 1997-01
## 79   9 400   Osprey 1997-01
## 80   8 381   Osprey 1997-01
## 81   8 332   Osprey 1997-01
## 82   7 394   Osprey 1997-01
## 83   7 388   Osprey 1997-01
## 84   7 354   Osprey 1997-01
## 85   7 320   Osprey 1997-01
## 86   6 320   Osprey 1997-01
## 87   6 347   Osprey 1997-01
## 88   6 360   Osprey 1997-01
## 89   5 354   Osprey 1997-01
## 90   5 335   Osprey 1997-01
## 91   5 313   Osprey 1997-01
## 92   5 289   Osprey 1997-01
## 93   4 313   Osprey 1997-01
## 94   4 298   Osprey 1997-01
## 95   3 279   Osprey 1997-01
```

```
## 96   3 273   Osprey 1997-01
```

```
#4.Printing the first and last 3 records from the BullTroutRMS2 dataset
head(BullTroutRML2,n=3)
```

```
##   age  fl    lake     era
## 1  14 459 Harrison 1977-80
## 2  12 449 Harrison 1977-80
## 3  10 471 Harrison 1977-80
```

```
tail(BullTroutRML2,n=3)
```

```
##    age  fl   lake     era
## 94   4 298 Osprey 1997-01
## 95   3 279 Osprey 1997-01
## 96   3 273 Osprey 1997-01
```

```
#5. Remove all records except those from Harrison Lake
harrison_data_new <- filter(BullTroutRML2, lake=='Harrison')
harrison_data_new
```

```
##    age  fl    lake     era
## 1   14 459 Harrison 1977-80
## 2   12 449 Harrison 1977-80
## 3   10 471 Harrison 1977-80
## 4   10 446 Harrison 1977-80
## 5    9 400 Harrison 1977-80
## 6    9 440 Harrison 1977-80
## 7    9 462 Harrison 1977-80
## 8    8 480 Harrison 1977-80
## 9    8 449 Harrison 1977-80
## 10   7 437 Harrison 1977-80
## 11   7 431 Harrison 1977-80
## 12   7 425 Harrison 1977-80
## 13   7 419 Harrison 1977-80
## 14   6 409 Harrison 1977-80
## 15   6 397 Harrison 1977-80
## 16   5 419 Harrison 1977-80
## 17   5 381 Harrison 1977-80
## 18   5 363 Harrison 1977-80
## 19   5 351 Harrison 1977-80
## 20   4 372 Harrison 1977-80
## 21   2 199 Harrison 1977-80
## 22   2 184 Harrison 1977-80
## 23   1  91 Harrison 1977-80
## 24  12 440 Harrison 1997-01
## 25  11 428 Harrison 1997-01
## 26  10 440 Harrison 1997-01
## 27  10 422 Harrison 1997-01
## 28   9 434 Harrison 1997-01
## 29   9 415 Harrison 1997-01
## 30   9 406 Harrison 1997-01
```

```
## 31   8 434 Harrison 1997-01
## 32   8 406 Harrison 1997-01
## 33   8 375 Harrison 1997-01
## 34   7 415 Harrison 1997-01
## 35   7 394 Harrison 1997-01
## 36   6 381 Harrison 1997-01
## 37   6 357 Harrison 1997-01
## 38   5 341 Harrison 1997-01
## 39   5 326 Harrison 1997-01
## 40   4 304 Harrison 1997-01
## 41   4 292 Harrison 1997-01
## 42   4 270 Harrison 1997-01
## 43   4 252 Harrison 1997-01
## 44   4 221 Harrison 1997-01
## 45   3 258 Harrison 1997-01
## 46   3 233 Harrison 1997-01
## 47   3 211 Harrison 1997-01
## 48   3 205 Harrison 1997-01
## 49   3 180 Harrison 1997-01
## 50   2 196 Harrison 1997-01
## 51   2 171 Harrison 1997-01
## 52   2 143 Harrison 1997-01
## 53   1 131 Harrison 1997-01
## 54   1  88 Harrison 1997-01
## 55   1  75 Harrison 1997-01
## 56   0  51 Harrison 1997-01
## 57   0  41 Harrison 1997-01
## 58   0  20 Harrison 1997-01
## 59   7 245 Harrison 1997-01
## 60   7 279 Harrison 1997-01
## 61   5 245 Harrison 1997-01
```

#6. Display the first and last 5 records from the filtered BullTroutRML2 dataset
```
head(harrison_data_new, n=5)
```

```
##   age  fl     lake      era
## 1  14 459 Harrison 1977-80
## 2  12 449 Harrison 1977-80
## 3  10 471 Harrison 1977-80
## 4  10 446 Harrison 1977-80
## 5   9 400 Harrison 1977-80
```

```
tail(harrison_data_new,n=5)
```

```
##    age  fl     lake      era
## 57   0  41 Harrison 1997-01
## 58   0  20 Harrison 1997-01
## 59   7 245 Harrison 1997-01
## 60   7 279 Harrison 1997-01
## 61   5 245 Harrison 1997-01
```

```
#7. Display the structure of the filtered BullTroutRML2dataset
str(harrison_data_new)
```

```
## 'data.frame':    61 obs. of  4 variables:
##  $ age : int  14 12 10 10 9 9 9 8 8 7 ...
##  $ fl  : int  459 449 471 446 400 440 462 480 449 437 ...
##  $ lake: Factor w/ 2 levels "Harrison","Osprey": 1 1 1 1 1 1 1 1 1 1 ...
##  $ era : Factor w/ 2 levels "1977-80","1997-01": 1 1 1 1 1 1 1 1 1 1 ...
```

```
#8. Display the summary of the filtered BullTroutRML2dataset
summary(harrison_data_new)
```

```
##       age              fl            lake          era
##  Min.   : 0.000   Min.   : 20   Harrison:61   1977-80:23
##  1st Qu.: 3.000   1st Qu.:221   Osprey  : 0   1997-01:38
##  Median : 6.000   Median :372
##  Mean   : 5.754   Mean   :319
##  3rd Qu.: 8.000   3rd Qu.:425
##  Max.   :14.000   Max.   :480
```

```
#9. Create a scatterplot for "age" (y variable) and "fl" (x variable) with the following specifications
# Limit of x axis is (0,500)
# Limit of y axis is (0,15)
# Title of graph is "Plot 1: Harrison Lake Trout
# Y axis label is "Age (yrs)"
# X axis label is "Fork Length (mm)"
# Use a small filled circle for the plotted data points
install.packages('ggplot2')
```

```
## Warning: package 'ggplot2' is in use and will not be installed
```
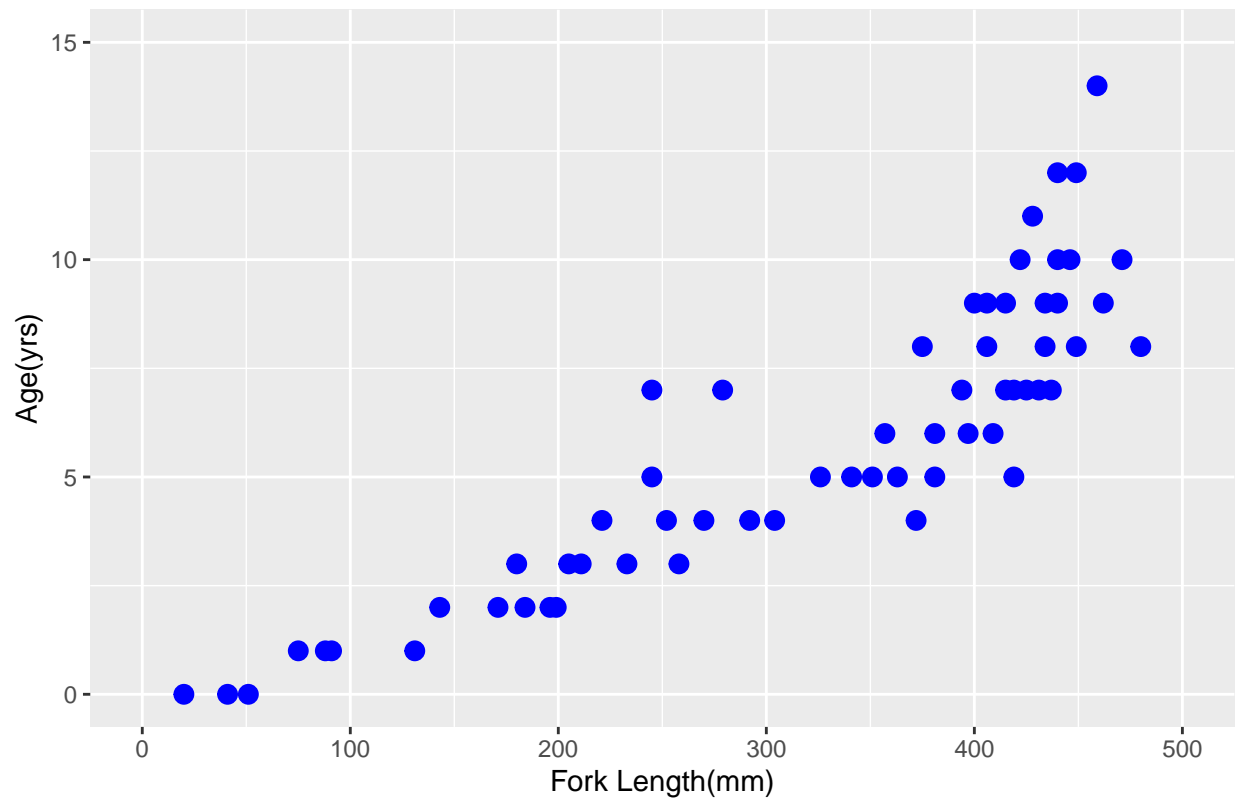
```
library('ggplot2')

?ggplot
```

```
## starting httpd help server ...
```

```
##  done
```

```
scatter_plot <- ggplot(harrison_data_new, aes(x=fl,y=age)) +
                geom_point(colour ="blue",size = 3) +
                xlim(0,500) + ylim(0,15) + labs(x="Fork Length(mm)",
                y="Age(yrs)",title="Plot 1: Harrison Lake Trout")+
                theme(plot.title = element_text(hjust = 0.5))
scatter_plot
```

Plot 1: Harrison Lake Trout


```
#10. Plot an "Age" histogram with the following specifications
#Y axis label is "Frequency"
#X axis label is "Age (yrs)"
#Title of the histogram is "Plot 2: Harrison Fish Age Distribution"
#X and Y axis limits is 0, 15
#The color of the frequency plots is "cadetblue"
#The color of the Title is "cadetblue"
#to plot the scatter plot graph
hist(harrison_data_new$age,xlab = "Age(yrs)", ylab = "Frequency",
        main = "Plot 2:Harrison Fish Age Distribution", xlim = c(0,15),
        ylim = c(0,15),col = 'cadetblue',col.axis='cadetblue',col.main = 'cadetblue')
```

Plot 2:Harrison Fish Age Distribution
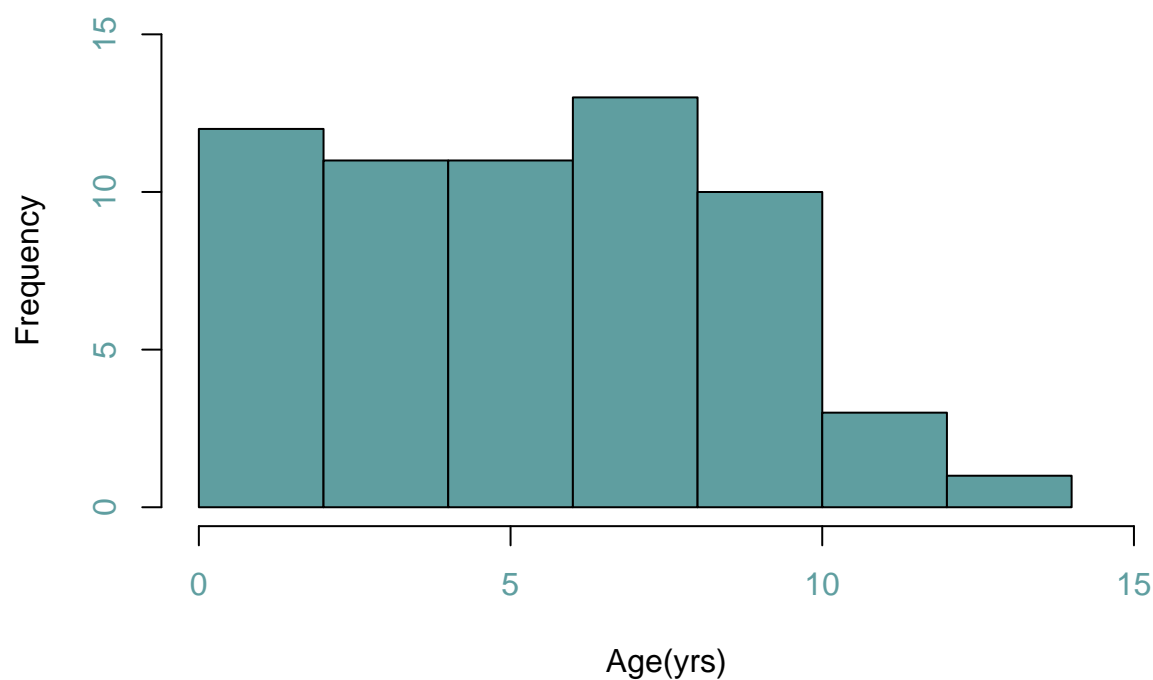

```
fl <- harrison_data_new$fl
age <- harrison_data_new$age
#11. Create an overdense plot using the same specifications as the previous scatterplot. But,
#Title the plot "Plot 3: Harrison Density Shaded by Era"
#Y axis label is "Age (yrs)"
#Y axis limits are 0 to 15
#X axis label is "Fork Length (mm)"
#X axis limits are 0 to 500
#include two levels of shading for the "green" data points.
#Plot solid circles as data points

overdense_plot <- plot(age ~ fl,
                    main = "Plot 3:Harrison Density Shaded by Era",
                    xlab = "Fork Length(mm)",
                    ylab = "Age(yrs)",
                    xlim = c(0,500),
                    ylim = c(0,15),
                    pch = 16,
                    col = rgb(0,(1:2)/2,0))
```

Plot 3:Harrison Density Shaded by Era
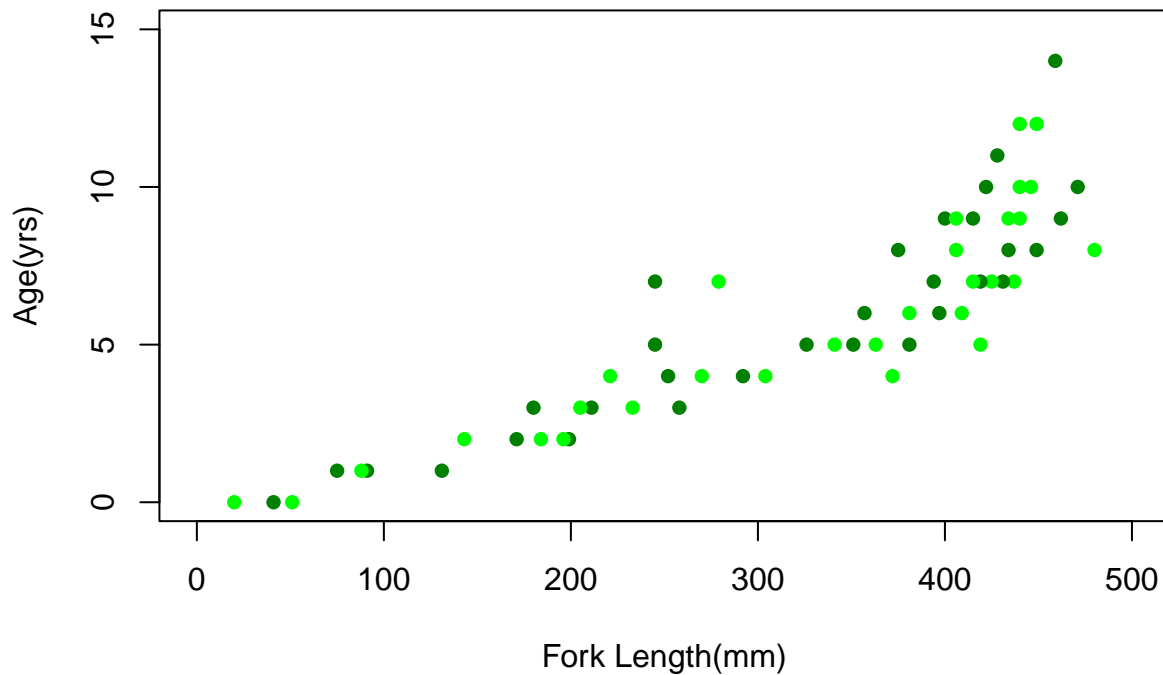

```
#12. Create a new object called "tmp" that includes the first 3 and last 3 records of the BullTroutRML2
tmp <- headtail(BullTroutRML2,n=3)
tmp
```

```
##     age  fl    lake      era
## 1    14 459 Harrison 1977-80
## 2    12 449 Harrison 1977-80
## 3    10 471 Harrison 1977-80
## 94    4 298   Osprey 1997-01
## 95    3 279   Osprey 1997-01
## 96    3 273   Osprey 1997-01
```

```
#13. Display the "era" column (variable) in the new "tmp" object
tmp$era
```

```
## [1] 1977-80 1977-80 1977-80 1997-01 1997-01 1997-01
## Levels: 1977-80 1997-01
```

```
#14.Create a pchs vector with the argument values for + and x.
pchs <- c('+','x')
pchs
```

```
## [1] "+" "x"
```

```
#15. Create a cols vector with the two elements "red" and "gray60"
cols <- c("red","gray60")
cols
```

```
## [1] "red"    "gray60"
```

```
#16.Convert the tmp era values to numeric values.
conversion <- as.numeric(tmp$era)
conversion
```

```
## [1] 1 1 1 2 2 2
```

```
#17. Initialize the cols vector with the tmp era values\
tmp$era <- cols
tmp$era
```

```
## [1] "red"    "gray60" "red"    "gray60" "red"    "gray60"
```

```
#18. Create a plot of "Age (yrs)" (y variable) versus "Fork Length (mm)" (x variable) with the following
#Title of graph is "Plot 4: Symbol & Color by Era"
#Limit of x axis is (0,500)
#Limit of y axis is (0,15)
#X axis label is "Age (yrs)"
#Y axis label is "Fork Length (mm)"
#Set pch equal to pchs era values
#Set col equal to cols era values
plot(age~fl, data= harrison_data_new, main = "Plot 4: Symbol & Color by Era",
     ylab = "Age (yrs)", ylim = c(0,15), xlab ="Fork Length (mm)",xlim = c(0,500),
     pch=pchs[harrison_data_new$era] , col=cols[harrison_data_new$era])
```

Plot 4: Symbol & Color by Era
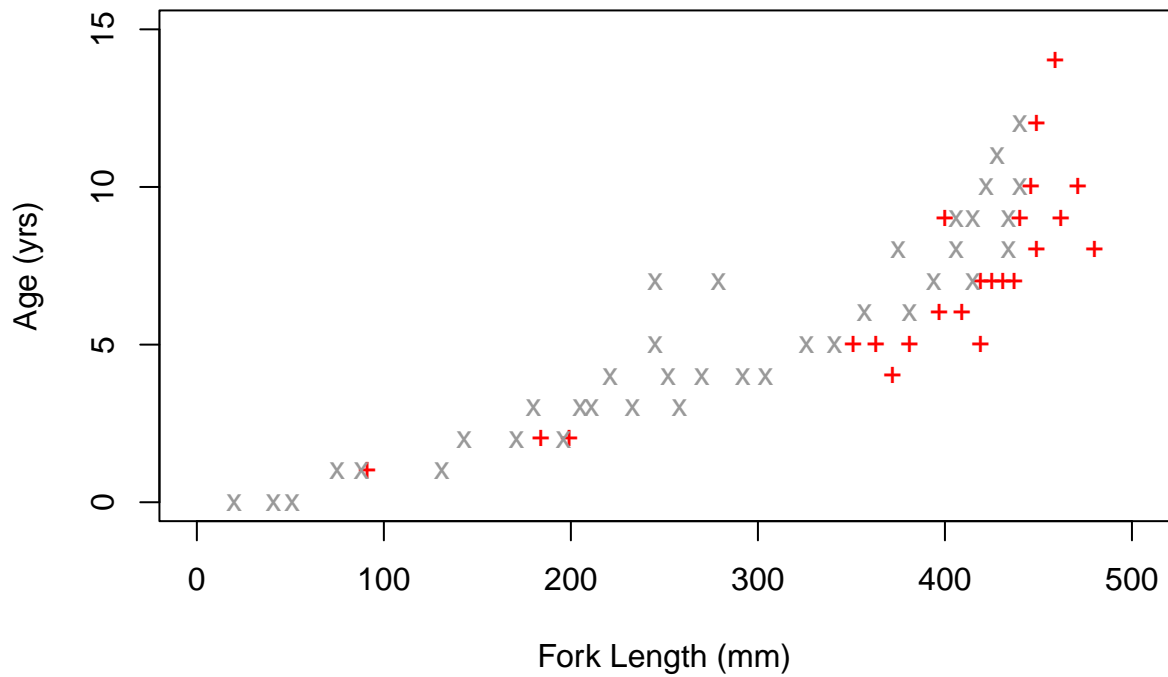

```
#19.Plot a regression line overlay on Plot 4 and title the new graph "Plot 5: Regression Overlay".
plot(age~fl, data= harrison_data_new, main = "Plot 5: Regression Overlay",
     ylab = "Age (yrs)", ylim = c(0,15), xlab ="Fork Length (mm)",xlim = c(0,500),
     pch=pchs[harrison_data_new$era] , col=cols[harrison_data_new$era])
rl <- lm(age~fl,data = harrison_data_new)
abline(rl)
```

Plot 5: Regression Overlay
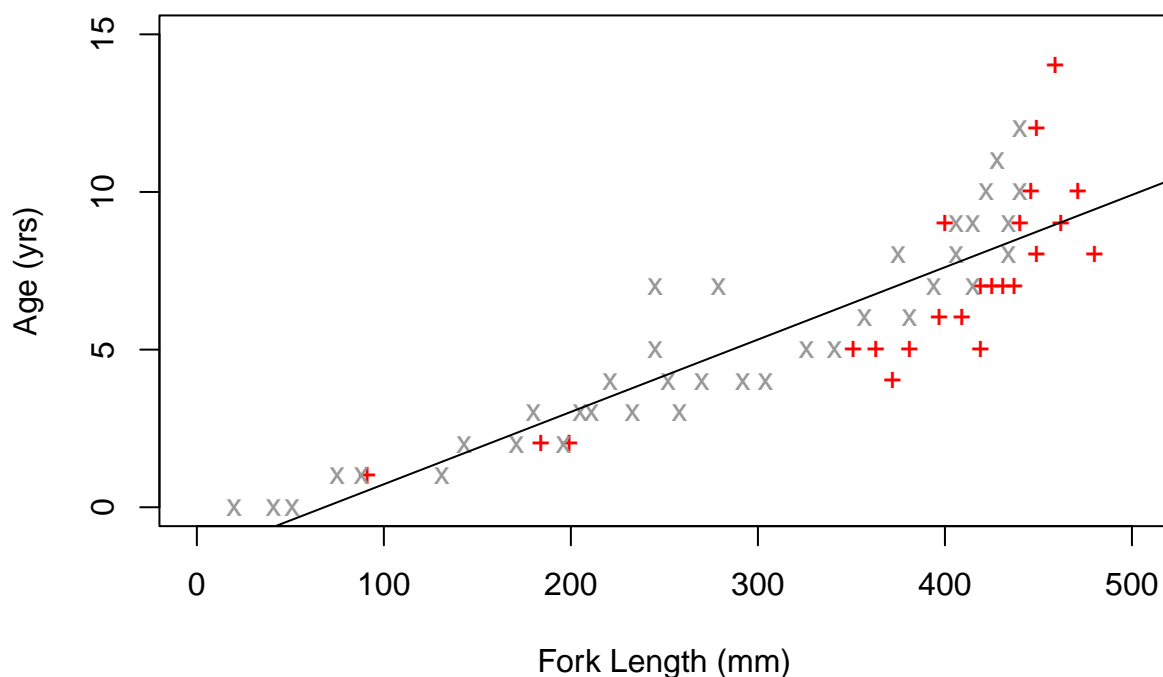

```
#20. Place a legend of on Plot 5 and call the new graph "Plot 6: :Legend Overlay"
plot(age~fl, data= harrison_data_new, main = "Plot 6: Legend Overlay",
     ylab = "Age (yrs)", ylim = c(0,15), xlab ="Fork Length (mm)",xlim = c(0,500),
     pch=pchs[harrison_data_new$era] , col=cols[harrison_data_new$era])
rl <- lm(age~fl,data = harrison_data_new)
abline(rl)
?legend
harrison_data_new$era #to find the levels.
```

```
##  [1] 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80
## [10] 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80 1977-80
## [19] 1977-80 1977-80 1977-80 1977-80 1977-80 1997-01 1997-01 1997-01 1997-01
## [28] 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01
## [37] 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01
## [46] 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01
## [55] 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01 1997-01
## Levels: 1977-80 1997-01
```

```
legend("topleft",legend = c("1977-80","1997-01"), pch = pchs, col = cols)
```

Plot 6: Legend Overlay