Lab 1 R Basics

Student Name

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Contents

Lab 1 Lab Manual Exercise

copy and paste your work by following each example from the lab manual for this exercise

```r
rm(list = setdiff(ls(), lsf.str()))
# Vectors and Factors
# Create a vector as input.
data <- c("East","West","East","North","North","East","West","West","West","East","North")

print(data)
```

```
##  [1] "East"  "West"  "East"  "North" "North" "East"  "West"  "West"  "West"
## [10] "East"  "North"
```

```r
print(is.factor(data))
```

```
## [1] FALSE
```

```r
# Apply the factor function.
factor_data <- factor(data)

print(factor_data)
```

```
##  [1] East  West  East  North North East  West  West  West  East  North
## Levels: East North West
```

```r
print(is.factor(factor_data))
```

```
## [1] TRUE
```

```r
# Data frames
# Create the vectors for data frame.
height <- c(132,151,162,139,166,147,122)
weight <- c(48,49,66,53,67,52,40)
gender <- c("male","male","female","female","male","female","male")

# Create the data frame.
input_data <- data.frame(height,weight,gender)
print(input_data)
```

```
##   height weight gender
## 1    132     48   male
## 2    151     49   male
## 3    162     66 female
## 4    139     53 female
## 5    166     67   male
## 6    147     52 female
## 7    122     40   male
```

```r
# Test if the gender column is a factor.
print(is.factor(input_data$gender))
```

```
## [1] FALSE
```

```r
# Print the gender column so see the levels.
print(input_data$gender)
```

```
## [1] "male"   "male"   "female" "female" "male"   "female" "male"
```

```r
# # Function Syntax
#
# function_name <- function(arg_1, arg_2, ...) {
#    Function body
# }


# Create a function with arguments.
new.function <- function(a,b,c) {
   result <- a * b + c
   print(result)
}

# Call the function by position of arguments.
new.function(5,3,11)
```

```
## [1] 26
```

```r
# Call the function by names of the arguments.
new.function(a = 11, b = 5, c = 3)
```

```
## [1] 58
```

```r
# From Mariam Aly's tutorial
################################################################################
## Factors
################################################################################
# A factor is a vector object used to specify a discrete classification (grouping) of the components of
# can be ordered or unordered

## Example for 'ragged arrays', which can have subclasses of different sizes
# say you have 6 subjects and 3 conditions in your experiment
# this is a list of the condition that each subject took part in
condition=c('faces','scenes','objects','faces','scenes','objects')
# can create a factor for condition
conditionf=factor(condition) #use the factor() function
# print to screen
print(conditionf)
```

```
## [1] faces   scenes  objects faces   scenes  objects
## Levels: faces objects scenes
```

```r
# produces:
# faces   scenes  objects faces   scenes  objects
# Levels: faces objects scenes
# can ask specifically for the levels of the factor
levels(conditionf) # returns "faces"   "objects" "scenes"
```

```
## [1] "faces"   "objects" "scenes"
```

```r
# you can then use the tapply() function to calculate things like the mean for a variable you have for
# continued from above
accuracy=c(90,88,72,84,81,94) # accuracy for each of you 6 subjects, in the same order in which you inp

# now calculate the mean accuracy for each condition using tapply()
# this function takes this form: tapply(data,factor/index variable,function), where factor/index is the

# so if you want to see mean age for males and females, data=age, factor/index=gender, function=mean
    # looks at data in the first variable as a function of different levels of the second variable
# note that tapply() will work even if the second argument is not a factor, because the argument will b

# e.g. calculate the mean
condaccmeans=tapply(accuracy,conditionf,mean)
print(condaccmeans)
```

```
##   faces objects  scenes
##    87.0    83.0    84.5
```

```
# returns :
# faces objects  scenes
  # 87.0    83.0    84.5
    # would work if you use tapply(accuracy,condition,mean) because condition would be coerced into a f

# The function tapply() is used to apply a function, here mean(), to each group  of components of the f
```

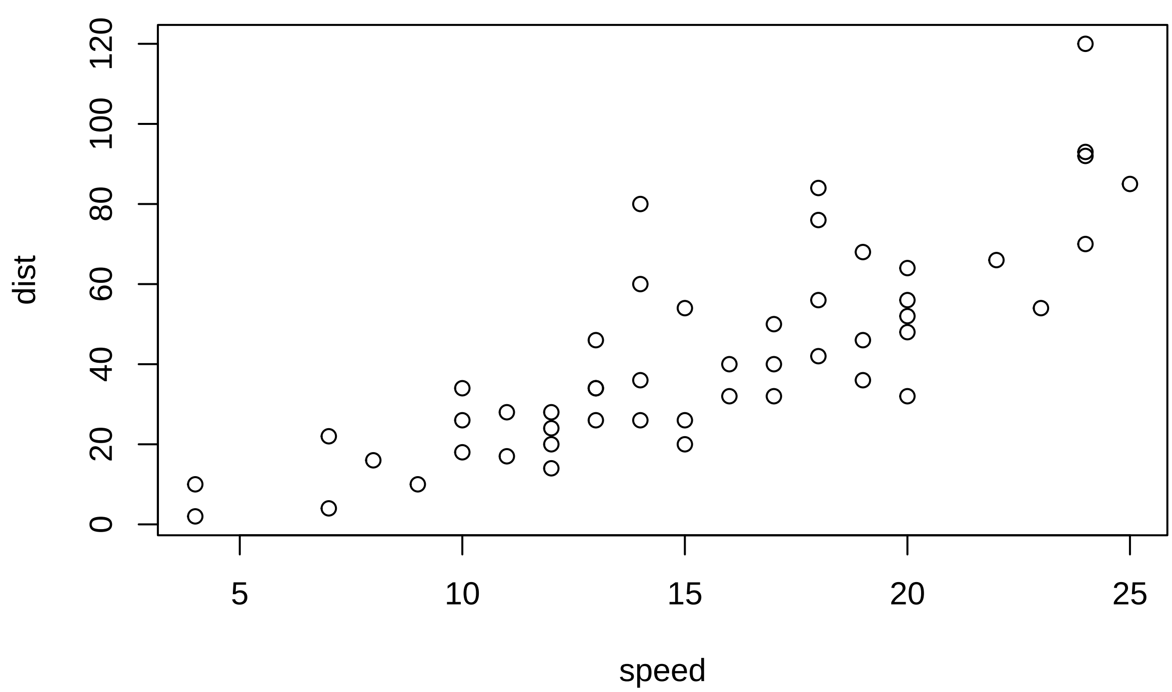
Lab 1 Generalization exercises

use the code from above to attempt to solve the extra things we ask you do for this assignment

```
View(cars)
summary(cars)
```

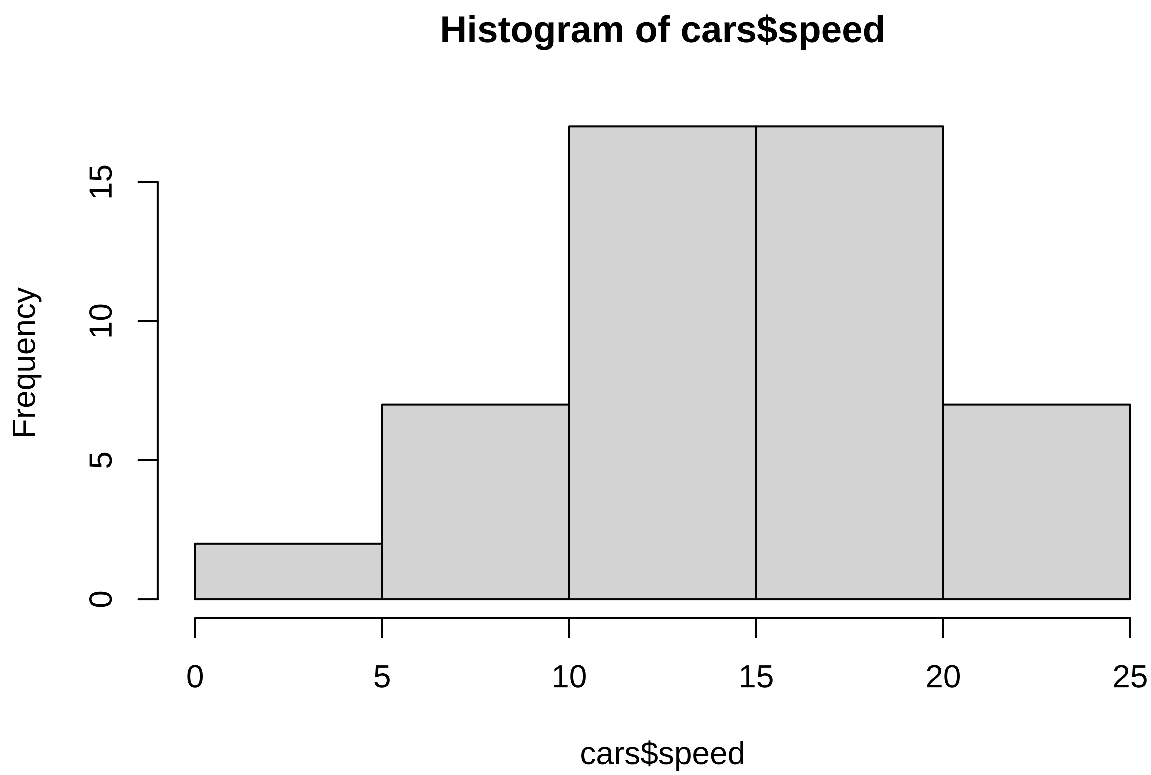
```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00
```

```
plot(cars)
```



```r
# Q1: what do you think is the relationship between speed and stopping distance based on the scatterplo
# Q2: plot a histogram of car speeds (use hist)
# Q3: what is the most frequent stopping distance in this dataset (an approx bin of distances is fine)?

hist(cars$speed)
```




```r
summary(cars$dist)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    2.00   26.00   36.00   42.98   56.00  120.00
```

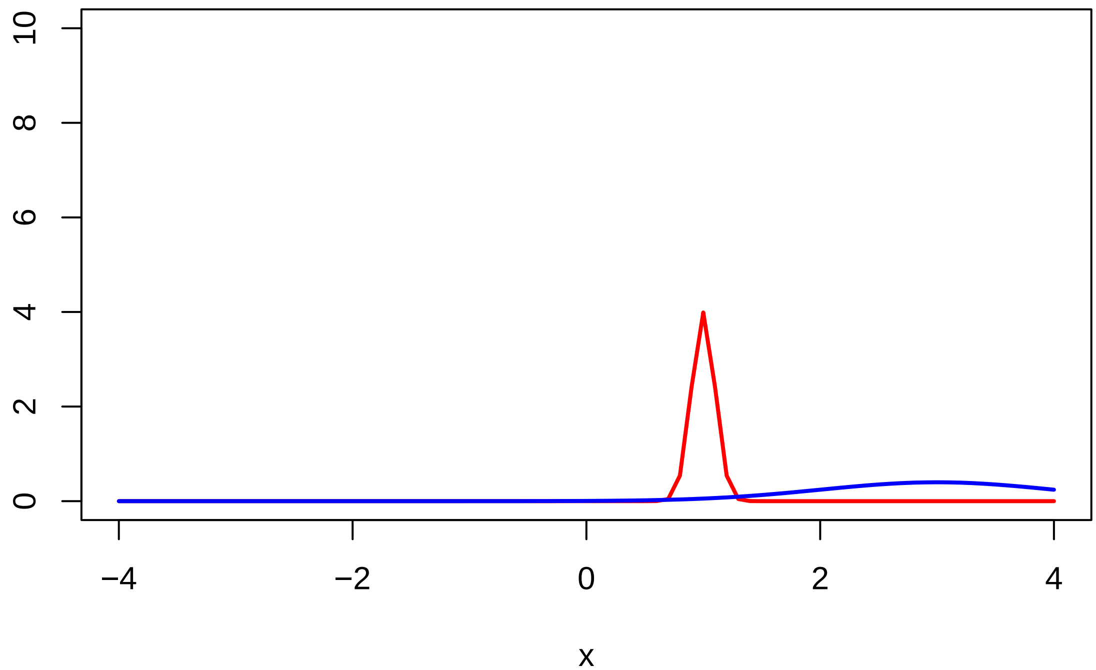
```r
# calc mode
names(sort(-table(cars$dist)))[1]
```

```
## [1] "26"
```

Lab 1 Written answer question

```r
# Grid of X-axis values
x <- seq(-4, 4, 0.1)
```

```r
#------------------------------------------
# Same standard deviation, different mean
#------------------------------------------
# Mean 0, sd 1
plot(x, dnorm(x, mean = 1, sd = 0.1), type = "l",
     ylim = c(0, 10), ylab = "", lwd = 2, col = "red")
# Mean 3, sd 1
lines(x, dnorm(x, mean = 3, sd = 1), col = "blue", lty = 1, lwd = 2)
```



Write your answer here.