****

Part1) Strings

Code Section 1.a:

```
file <- "https://people.bu.edu/kalathur/datasets/mlk.txt"

words <- scan(file,what = character())

--------------------------------------------------------------------------


#a)

#using str_subset method with special expression

str_subset(words,"[:punct:]")



#Alternatively

#1

#using str_detect functions from stringr

# words[str_detect(words,"[:punct:]")==TRUE]

#2

#using general expression method

# grep("[[:punct:]]",words,value = TRUE)
```

Console section 1.a:

```
> file <- "https://people.bu.edu/kalathur/datasets/mlk.txt"
```

```
> words <- scan(file,what = character())

Read 288 items

 #a)

> #using str_subset method with special expression

> str_subset(words,"[:punct:]")

 [1] "today,"         "friends,"       "moment,"        "dream."         "dream."
"creed:"         "self-evident:"  "equal."         "slave-owners"

[10] "brotherhood."   "Mississippi,"   "state,"         "oppression,"    "justice."
"character."     "today."         "Alabama,"       "governor’s"

[19] "nullification," "brothers."      "today."         "exalted,"       "low,"
"plain,"         "straight,"      "revealed,"      "together."

> #Alternatively

> #1

> #using str_detect functions from stringr

> # words[str_detect(words,"[:punct:]")==TRUE]

> #2

> #using general expression method

> # grep("[[:punct:]]",words,value = TRUE)
```

Code Section 1.b:

```
#b)
#using str_replace method
replace_punct <- str_replace_all(words,"[:punct:]","")
replace_punct
```

```
#Alternatively, we can use gsub method
# gsub("[[:punct:][:blank:]]+", " ",words)


#now converting all words to lower case
new_words <- str_to_lower(replace_punct)

#alternatively we can use tolower method as well
# tolower(replace_punct)
```

Console section 1.b:

```
#b)
> #using str_replace method
> replace_punct <- str_replace_all(words,"[:punct:]","")
> replace_punct
  [1] "I"           "say"         "to"          "you"         "today"       "my"          "friends"
"that"        "in"          "spite"
 [11] "of"          "the"         "difficulties"  "and"         "frustrations"  "of"
"the"         "moment"      "I"           "still"
 [21] "have"        "a"           "dream"       "It"          "is"          "a"           "dream"
"deeply"      "rooted"      "in"
 [31] "the"         "American"    "dream"       "I"           "have"        "a"
"dream"       "that"        "one"         "day"
 [41] "this"        "nation"      "will"        "rise"        "up"          "and"         "live"
"out"         "the"         "true"
 [51] "meaning"     "of"          "its"         "creed"       "We"          "hold"
"these"       "truths"      "to"          "be"
 [61] "selfevident"   "that"        "all"         "men"         "are"         "created"
"equal"       "I"           "have"        "a"
 [71] "dream"       "that"        "one"         "day"         "on"          "the"         "red"
"hills"       "of"          "Georgia"
 [81] "the"         "sons"        "of"          "former"      "slaves"      "and"
"the"         "sons"        "of"          "former"
 [91] "slaveowners"   "will"        "be"          "able"        "to"          "sit"
"down"        "together"    "at"          "a"
```

[101] "table" "of" "brotherhood" "I" "have" "a"
"dream" "that" "one" "day"
[111] "even" "the" "state" "of" "Mississippi" "a"
"desert" "state" "sweltering" "with"
[121] "the" "heat" "of" "injustice" "and" "oppression"
"will" "be" "transformed" "into"
[131] "an" "oasis" "of" "freedom" "and" "justice" "I"
"have" "a" "dream"
[141] "that" "my" "four" "children" "will" "one"
"day" "live" "in" "a"
[151] "nation" "where" "they" "will" "not" "be"
"judged" "by" "the" "color"
[161] "of" "their" "skin" "but" "by" "the"
"content" "of" "their" "character"
[171] "I" "have" "a" "dream" "today" "I" "have"
"a" "dream" "that"
[181] "one" "day" "the" "state" "of" "Alabama"
"whose" "governors" "lips" "are"
[191] "presently" "dripping" "with" "the" "words" "of"
"interposition" "and" "nullification" "will"
[201] "be" "transformed" "into" "a" "situation" "where"
"little" "black" "boys" "and"
[211] "black" "girls" "will" "be" "able" "to" "join"
"hands" "with" "little"
[221] "white" "boys" "and" "white" "girls" "and"
"walk" "together" "as" "sisters"
[231] "and" "brothers" "I" "have" "a" "dream"
"today" "I" "have" "a"
[241] "dream" "that" "one" "day" "every" "valley"
"shall" "be" "exalted" "every"
[251] "hill" "and" "mountain" "shall" "be" "made"
"low" "the" "rough" "places"
[261] "will" "be" "made" "plain" "and" "the"
"crooked" "places" "will" "be"
[271] "made" "straight" "and" "the" "glory" "of"
"the" "Lord" "shall" "be"

```
[281] "revealed"    "and"    "all"    "flesh"    "shall"    "see"    "it"
"together"
>
> #Alternatively, we can use gsub method
> # gsub("[[:punct:][:blank:]]+", " ",words)
>
>
> #now converting all words to lower case
> new_words <- str_to_lower(replace_punct)
>
> #alternatively we can use tolower method as well
> # tolower(replace_punct)
```

Code section 1.c:

```
#c)
# getting top 5 numbers of words involves 3 steps
#1. table functions count the number of each words present
#2. sort function sort he words based on their frequency in increasing order
#3  decreasing()  method arrage the words based decreasing order of their
#frequencies and finally seling top 5 words.
top5.words <- sort(table(new_words),decreasing = TRUE)[1:5]
top5.words
```

Console section 1.c:

```
#c)
> # getting top 5 numbers of words involves 3 steps
> #1. table functions count the number of each words present
> #2. sort function sort he words based on their frequency in increasing order
> #3  decreasing()  method arrage the words based decreasing order of their
> #frequencies and finally seling top 5 words.
> top5.words <- sort(table(new_words),decreasing = TRUE)[1:5]
> top5.words
new_words
the  of   a and  be
```

17 15 14 14 11

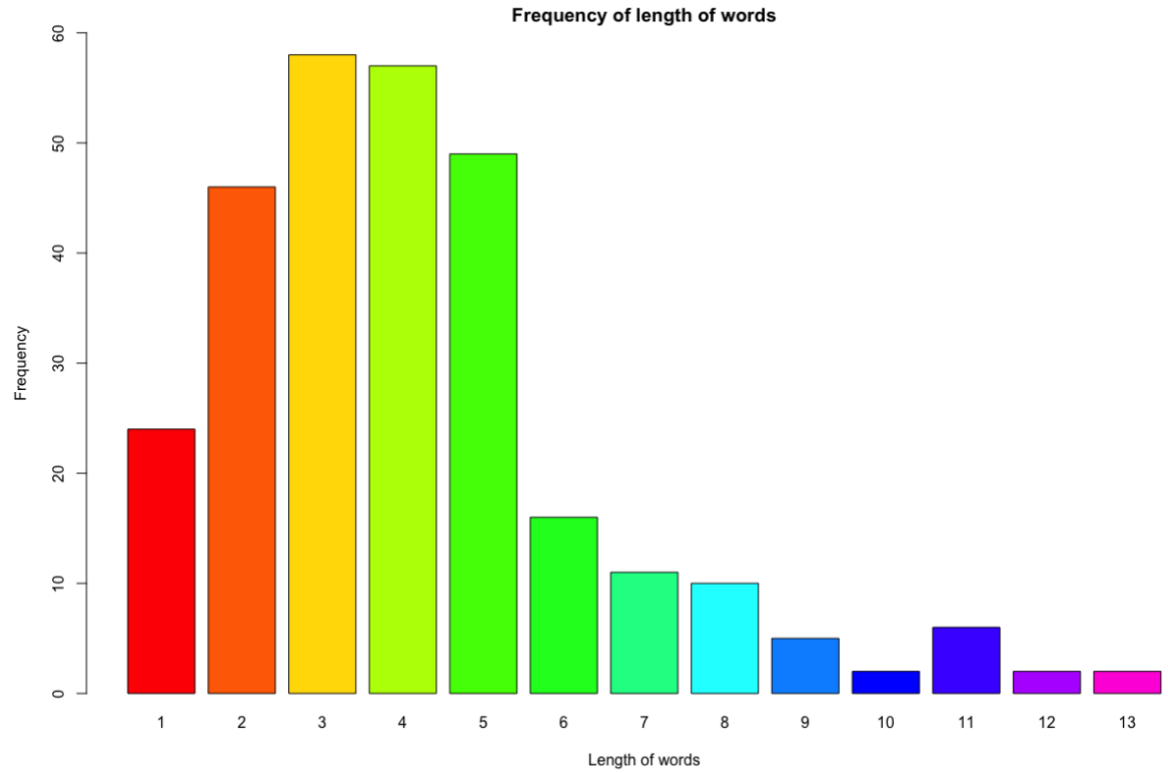
Code setion 1.d:

```
#d)
# in this solution, I am going to find the lengths of each word and then find
#  the frequency of each length types.
length.of.words <- str_length(new_words)
frequency.of.word.length <- table(length.of.words)

#alternatively we can also use nchar() method to check the frequencies.
 #table(nchar(new_words))

#now showing frequencies using bar plot.
par(mar=c(5,5,2,2))
barplot(frequency.of.word.length,xlab = "Length of words",ylab = "Frequency",
       main = "Frequency of length of words",col = rainbow(14),ylim = c(0,60))
```

Console section1.d:

```
#d)
> # in this solution, I am going to find the lengths of each word and then find
> #  the frequency of each length types.
> length.of.words <- str_length(new_words)
> frequency.of.word.length <- table(length.of.words)
>
> #alternatively we can also use nchar() method to check the frequencies.
>  #table(nchar(new_words))
>
> #now showing frequencies using bar plot.
> par(mar=c(5,5,2,2))
> barplot(frequency.of.word.length,xlab = "Length of words",ylab = "Frequency",
+        main = "Frequency of length of words",col = rainbow(14),ylim = c(0,60))
```

Plot section 1.d:



Code section 1.e:

```
#e)
#for this,I will calculate the length of each words and then find the maximum value
# i.e and find the word/s which have that maximum length.
longest.words <- new_words[str_length(new_words)==max(str_length(new_words))]
longest.words
```

Console section 1.e:

```
#e)
> #for this,I will calculate the length of each words and then find the maximum value
> # i.e and find the word/s which have that maximum length.
> longest.words <- new_words[str_length(new_words)==max(str_length(new_words))]
> longest.words
[1] "interposition" "nullification"
```

Code section 1.f:

```
#f)
#for this I will be suing str_detect method as follows
str_subset(new_words,"^c")

#alternatively
#new_words[str_detect(new_words,"^c")]
```

Console section 1.f:

```
> #f)
> #for this I will be suing str_detect method as follows
> str_subset(new_words,"^c")
[1] "creed"     "created"   "children"  "color"     "content"   "character" "crooked"
>
> #alternatively
> #new_words[str_detect(new_words,"^c")]
```

Code section 1.g:

```
#g)
# again for this, i will be using str_detect method as follows
str_subset(new_words,"r$")

# there are words that ends with r and occurs more than one time.We can take
one
# words using unique method

#Alternatively
#new_words[str_detect(new_words,"r$")]
```

Console section 1.g:

```
#g)
> # again for this, i will be using str_detect method as follows
> str_subset(new_words,"r$")
 [1] "former"    "former"    "together"  "four"      "color"     "their"     "their"
"character" "together"  "together"
>
> # there are words that ends with r and occurs more than one time.We can take
one
```

```
> # words using unique method
>
> #Alternatively
> #new_words[str_detect(new_words,"r$")]
```

Code section 1.h:

```
#h)
#for this we can combine  solution in f and g.
# using str_subset method.

str_subset(new_words,"^c(.)*r$")
#alternatively
# \\b word boundry \\w* represent any words with zero or more characters.
# matches.br <- str_detect(new_words, "\\bc\\w*r\\b")
# new_words[matches.br]
```

Console section 1.h

```
> #h)
> #for this we can combine  solution in f and g.
> # using str_subset method.
>
> str_subset(new_words,"^c(.)*r$")
[1] "color"     "character"
> #alternatively
> # \\b word boundry \\w* represent any words with zero or more characters.
> # matches.br <- str_detect(new_words, "\\bc\\w*r\\b")
> # new_words[matches.br]
>
```

Last part of Part one:

Code Part:

```
#last part of Part 1
stopfile <- "https://people.bu.edu/kalathur/datasets/stopwords.txt"
stopwords <- scan (stopfile, what=character())
# removing the stop words
new.words <- subset(new_words,!new_words %in% stopwords)
length(new.words)
```

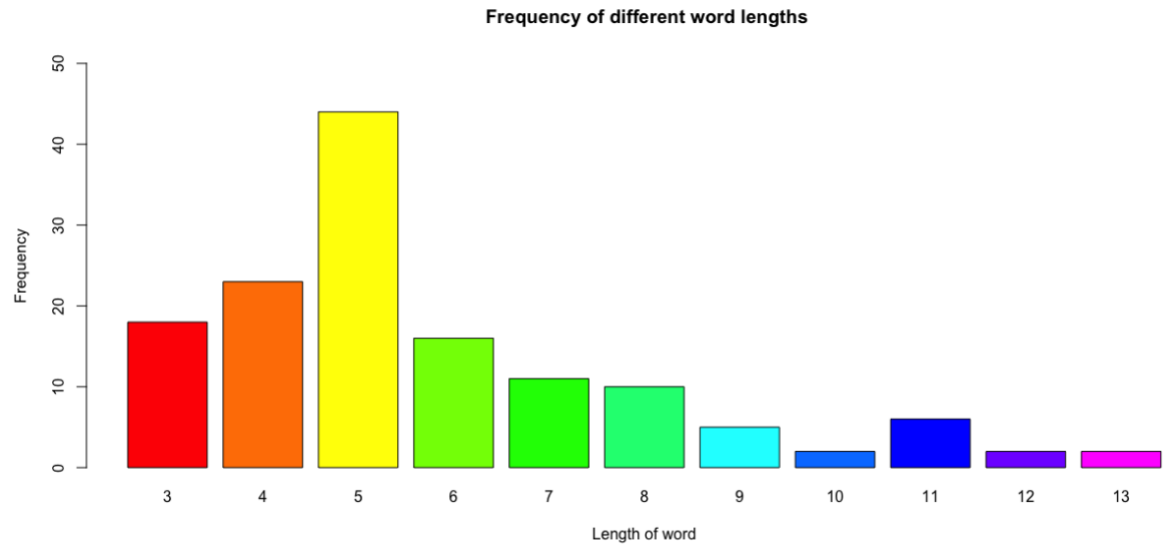
```
#now finding the top 5 frequent words
# using same steps as answer in c.
new.top5.words <- sort(table(new.words),decreasing = TRUE)[1:5]
new.top5.words

# finding frequency of word lengths
frequency.word.length.2 <- table(nchar(new.words))
par(mar=c(5,5,5,2))
barplot(frequency.word.length.2,xlab = "Length of word",ylab = "Frequency",
      main = " Frequency of different word lengths", col = rainbow(12),
      ylim = c(0,50))
```

Console part:

```
> #last part of Part 1
> stopfile <- "https://people.bu.edu/kalathur/datasets/stopwords.txt"
> stopwords <- scan(stopfile, what=character())
Read 176 items
> # removing the stop words
> new.words <- subset(new_words,!new_words %in% stopwords)
> length(new.words)
[1] 139
>
> #now finding the top 5 frequent words
> # using same steps as answer in c.
> new.top5.words <- sort(table(new.words),decreasing = TRUE)[1:5]
> new.top5.words
new.words
dream   day   one shall  made
  11     6     6     4     3
>
> # finding frequency of word lengths
> frequency.word.length.2 <- table(nchar(new.words))
> par(mar=c(5,5,5,2))
> barplot(frequency.word.length.2,xlab = "Length of word",ylab = "Frequency",
+       main = " Frequency of different word lengths", col = rainbow(12),
```

+ ylim = c(0,50))
>

Plot part:



Part2) Data Wrangling

Code section 2.a:

```
temp.data <-
read.csv("/Users/kokildhakal/Desktop/STUDY/BU/7.CS544/Module6/usa_daily_avg_temps.csv”
)
#a)
usaDailyTemps <- as_tibble(temp.data)
head(usaDailyTemps)
```

Console section 2.a:

```
> temp.data <-
read.csv("/Users/kokildhakal/Desktop/STUDY/BU/7.CS544/Module6/usa_daily_avg_temps.csv"
)
>
>
```

```
> #a)
> usaDailyTemps <- as_tibble(temp.data)
> head(usaDailyTemps)
# A tibble: 6 × 6
  state   city       month   day  year avgtemp
  <chr>   <chr>      <int> <int> <int>   <dbl>
1 Alabama Birmingham     1     1  1995    50.7
2 Alabama Birmingham     1     1  1996    56.8
3 Alabama Birmingham     1     1  1997    60.9
4 Alabama Birmingham     1     1  1998    35.6
5 Alabama Birmingham     1     1  1999    41
6 Alabama Birmingham     1     1  2000    59
>
```

Cose section2.b:

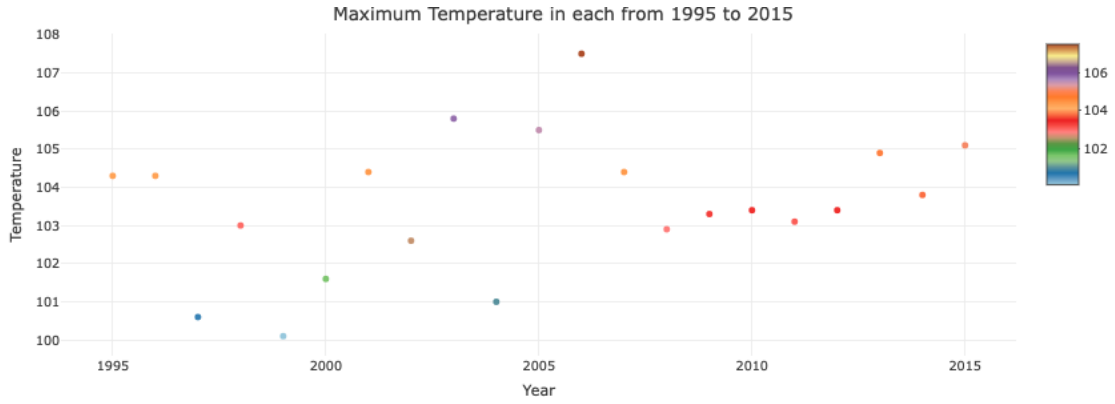
```
max.temp <- usaDailyTemps|>
  group_by(year) |>
  summarise(maximum_Temp=max(avgtemp))
#maximu temperature by Year
max.temp

#plotting
plot_ly(y=max.temp$maximum_Temp,x=max.temp$year,type = "scatter",
        color = max.temp$maximum_Temp,colors = "Paired",mode ="markers") |>
  layout(title = "Maximum Temperature in each from 1995 to 2015",
         xaxis=list(title="Year"),
         yaxis=list(title="Temperature"))
```

Console section 2.b:

```
> max.temp <- usaDailyTemps|>
+   group_by(year) |>
+   summarise(maximum_Temp=max(avgtemp))
> #maximu temperature by Year
> max.temp
# A tibble: 21 × 2
    year maximum_Temp
   <int>       <dbl>
```

```
 1  1995       104.
 2  1996       104.
 3  1997       101.
 4  1998       103
 5  1999       100.
 6  2000       102.
 7  2001       104.
 8  2002       103.
 9  2003       106.
10  2004        101
# ℹ 11 more rows
# ℹ Use `print(n = ...)` to see more rows
>
>
> #plotting
> plot_ly(y=max.temp$maximum_Temp,x=max.temp$year,type = "scatter",
+        color = max.temp$maximum_Temp,colors = "Paired",mode ="markers") |>
+   layout(title = "Maximum Temperature in each from 1995 to 2015",
+          xaxis=list(title="Year"),
+          yaxis=list(title="Temperature"))
>
```

Plot section 2.b:



Code section 2.c:

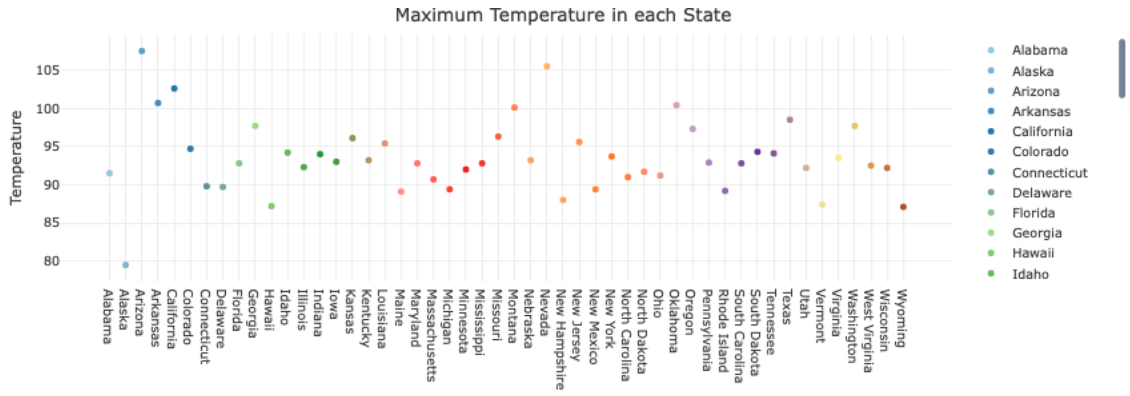
```
#c)
#finding maximum temperature by states
max.temp.by.states <- usaDailyTemps |>
  group_by(state)|>
  summarise(Maximum_Temp=max(avgtemp))
#maximum temperature by states
```

```
max.temp.by.states

plot_ly(y=max.temp.by.states$Maximum_Temp,x=max.temp.by.states$state,type = "scatter",
       color =max.temp.by.states$state,mode ="markers",colors = "Paired") |>
  layout(title = "Maximum Temperature in each State",yaxis=list(title="Temperature"))
```

Console section 2.c:

```
> #c)
> #finding maximum temperature by states
> max.temp.by.states <- usaDailyTemps |>
+   group_by(state)|>
+   summarise(Maximum_Temp=max(avgtemp))
> #maximum temperature by states
> max.temp.by.states
# A tibble: 50 × 2
   state      Maximum_Temp
   <chr>             <dbl>
 1 Alabama            91.5
 2 Alaska             79.5
 3 Arizona           108.
 4 Arkansas          101.
 5 California        103.
 6 Colorado           94.7
 7 Connecticut        89.8
 8 Delaware           89.7
 9 Florida            92.8
10 Georgia            97.7
# ℹ 40 more rows
# ℹ Use `print(n = ...)` to see more rows
>
> plot_ly(y=max.temp.by.states$Maximum_Temp,x=max.temp.by.states$state,type = "scatter",
+        color =max.temp.by.states$state,mode ="markers",colors = "Paired") |>
+   layout(title = "Maximum Temperature in each State",yaxis=list(title="Temperature"))
```

Plot section 2.c:



Code section 2.d:

```
#d)
#filtering data for Boston Only
bostonDailyTemps <- usaDailyTemps |>
  filter(city=="Boston")
head(bostonDailyTemps)
```

console section 2.d:

```
> #d)
> #filtering data for Boston Only
> bostonDailyTemps <- usaDailyTemps |>
+   filter(city=="Boston")
> head(bostonDailyTemps)
# A tibble: 6 × 6
  state         city   month   day  year avgtemp
  <chr>         <chr>  <int> <int> <int>   <dbl>
1 Massachusetts Boston     1     1  1995    38.5
2 Massachusetts Boston     1     1  1996    34.1
3 Massachusetts Boston     1     1  1997    10
4 Massachusetts Boston     1     1  1998    14.2
5 Massachusetts Boston     1     1  1999    21.7
6 Massachusetts Boston     1     1  2000    34.8
>
```

Code section 2.e:

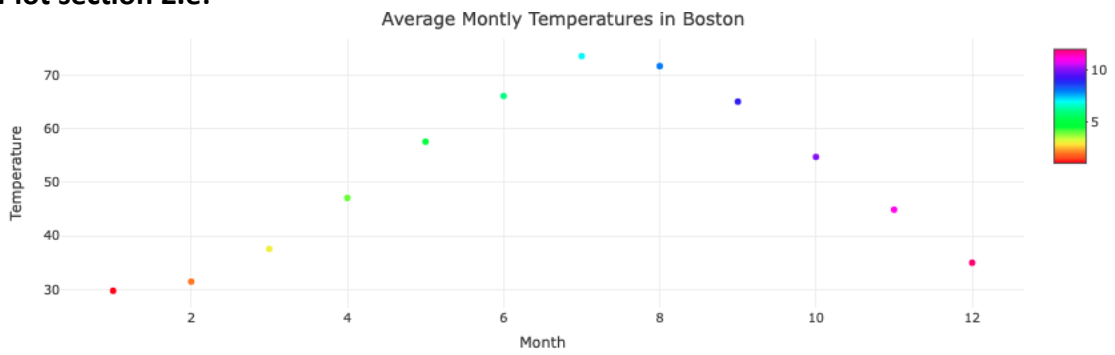
```
#e)
#finding average monthly temperatures of Boston
montly.avg.temp.boston <- bostonDailyTemps|>
  group_by(month)|>
```

```
  summarise(avg_temp=mean(avgtemp))

#average montly temperature in Boston
montly.avg.temp.boston

plot_ly(y=montly.avg.temp.boston$avg_temp,x=montly.avg.temp.boston$month,
       type = "scatter",color = montly.avg.temp.boston$month,colors=rainbow(12))|>
  layout (title="Average Montly Temperatures in Boston",
         yaxis=list(title="Temperature"),
        xaxis=list(title=" Month"))
```

Console section 2.e:

```
#e)
> #finding average monthly temperatures of Boston
> montly.avg.temp.boston <- bostonDailyTemps|>
+   group_by(month)|>
+   summarise(avg_temp=mean(avgtemp))
>
> #average montly temperature in Boston
> montly.avg.temp.boston
# A tibble: 12 × 2
   month avg_temp
   <int>    <dbl>
 1     1     29.8
 2     2     31.5
 3     3     37.6
 4     4     47.1
 5     5     57.6
 6     6     66.1
 7     7     73.6
 8     8     71.7
 9     9     65.1
10    10     54.7
11    11     44.9
12    12     35.0
>
> plot_ly(y=montly.avg.temp.boston$avg_temp,x=montly.avg.temp.boston$month,
+         type = "scatter",color = montly.avg.temp.boston$month,colors=rainbow(12))|>
+   layout(title="Average Montly Temperatures in Boston",
+          yaxis=list(title="Temperature"),
           xaxis=list(title="Month"))
```

Plot section 2.e:



The End:

**********8