Assignment 1

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1) Import the climate data.

```
ClimateData = read.table("D:/Yifu Qian's love/UCSB Learning/2016 -2017 Spring Quarter/Environmental Inf
summary(ClimateData)
```

```
##        date            tmin              tmax              rain
##  01/01/00:    1   Min.   :-21.111   Min.   :-15.556   Min.   :  0.000
##  01/01/01:    1   1st Qu.: -2.222   1st Qu.:  7.222   1st Qu.:  0.000
##  01/01/02:    1   Median :  1.667   Median : 13.889   Median :  0.000
##  01/01/03:    1   Mean   :  2.210   Mean   : 13.922   Mean   :  2.829
##  01/01/04:    1   3rd Qu.:  7.222   3rd Qu.: 21.111   3rd Qu.:  0.000
##  01/01/05:    1   Max.   : 26.111   Max.   : 32.778   Max.   :256.286
##  (Other) :27268
##       year          month             day              wy
##  Min.   :1942   Min.   : 1.000   Min.   : 1.00   Min.   :1942
##  1st Qu.:1960   1st Qu.: 4.000   1st Qu.: 8.00   1st Qu.:1960
##  Median :1979   Median : 7.000   Median :16.00   Median :1979
##  Mean   :1979   Mean   : 6.505   Mean   :15.73   Mean   :1979
##  3rd Qu.:1998   3rd Qu.: 9.000   3rd Qu.:23.00   3rd Qu.:1998
##  Max.   :2016   Max.   :12.000   Max.   :31.00   Max.   :2016
##
```

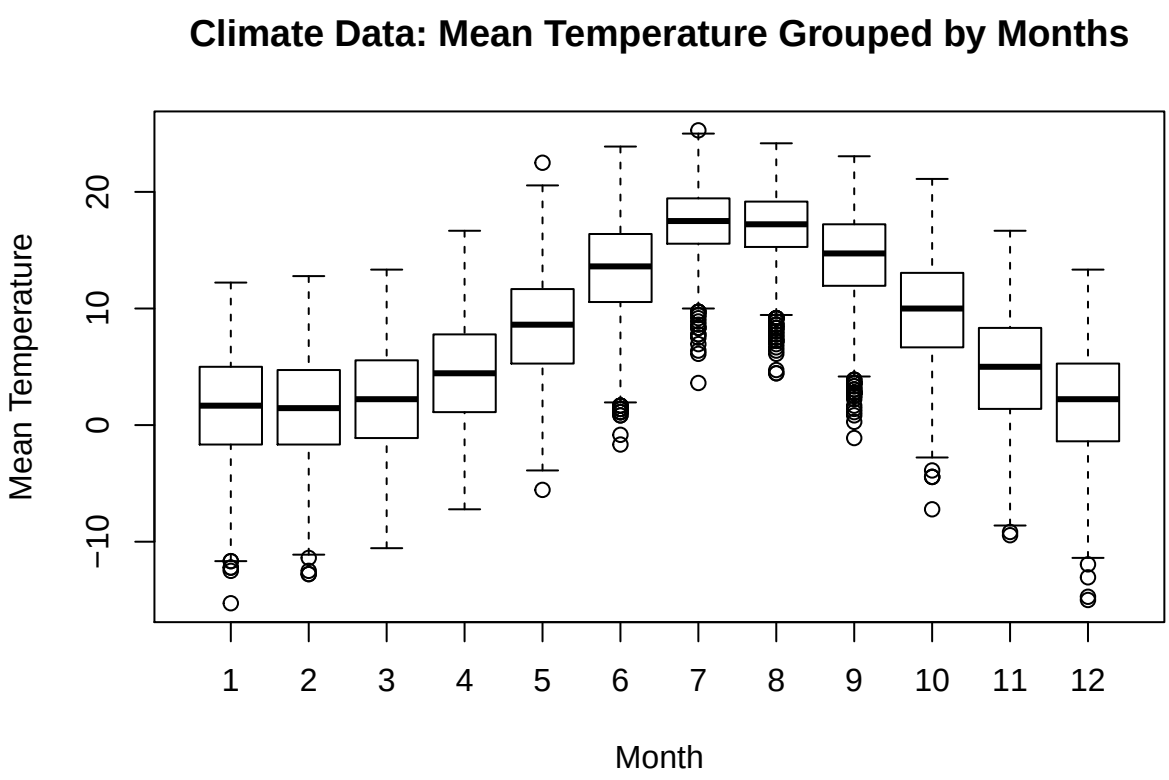
2) Graph precipitation and average temperature by month, using a box plot.

Add a average temperature column to the data.

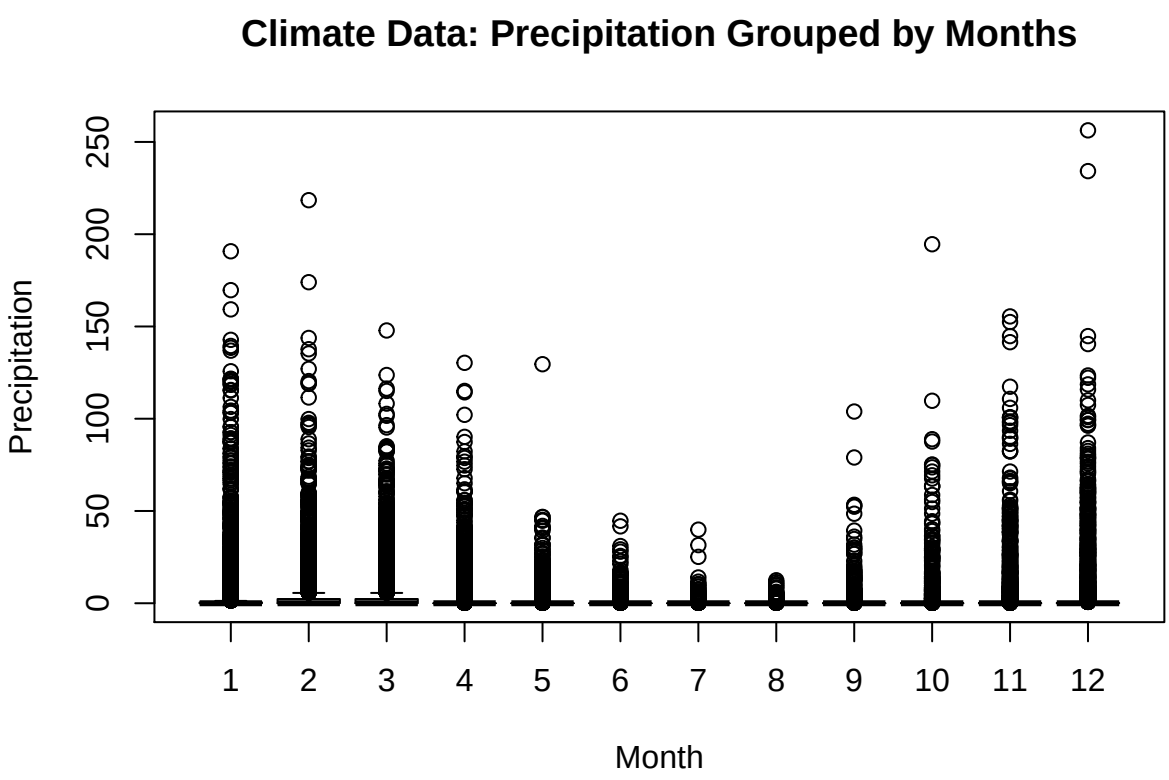
```
MeanTemp = (ClimateData$tmin + ClimateData$tmax)/2
ClimateData$tmean = MeanTemp
```

Using boxplot.

```
boxplot(data = ClimateData, tmean ~ month, main = "Climate Data: Mean Temperature Grouped by Months", x
```




```
boxplot(data = ClimateData, rain ~ month, main = "Climate Data: Precipitation Grouped by Months", xlab =
```



3) Find the wettest and dryest year.

```
rain.yr = aggregate(ClimateData$rain, by=list(ClimateData$year), sum)
colnames(rain.yr) = c("Year", "AnnualPrecipitation")
```

```
WetYear = which.max(rain.yr$AnnualPrecipitation)
rain.yr[WetYear,]
```

```
##    Year AnnualPrecipitation
## 41 1982            2135.378
```

```
DryYear = which.min(rain.yr$AnnualPrecipitation)
rain.yr[DryYear,]
```

```
##    Year AnnualPrecipitation
## 72 2013             263.398
```

Therefore, the wettest and the dryest year are 1982 and 2013 respectively.

4) Add two photos to show wet year and dry year.

5) Create a new "season" variable

```
ClimateData$Season = ifelse(ClimateData$month %in% c(11,12,1),4,
                            ifelse(ClimateData$month %in% c(2,3,4),1,
                                   ifelse(ClimateData$month %in% c(5,6,7),2,3)))
```

6) Find wettest and driest seasons

```
rain.onlyseason = aggregate(ClimateData$rain, by=list(ClimateData$Season), sum)

WetSeason = which.max(rain.onlyseason$x)
rain.onlyseason[WetSeason,]
```

```
##   Group.1        x
## 4       4 34615.12
```

```
DrySeason = which.min(rain.onlyseason$x)
rain.onlyseason[DrySeason,]
```

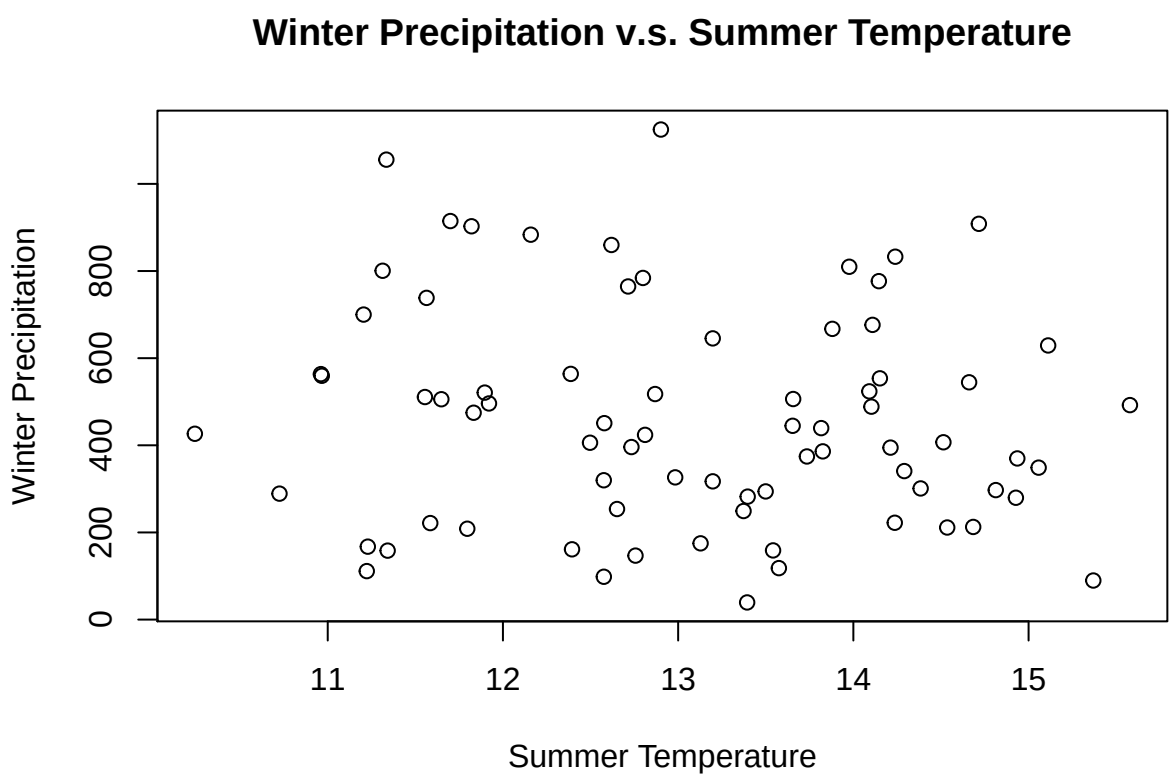
```
##   Group.1        x
## 2       2 4076.954
```

Therefore, the wettest season is winter and the dryest season is summer.

7) Plot the relationship between winter precipitation and summer temperature

```
rain.season = aggregate(ClimateData$rain, by=list(ClimateData$Season, ClimateData$year), sum)
temp.season = aggregate(ClimateData$tmean,by=list(ClimateData$Season, ClimateData$year), mean)

plot(rain.season$x[rain.season$Group.1 == "4"] ~ temp.season$x[temp.season$Group.1 == "2"], main = "Win
```



The plot shows that there not strong correlation between winter precipitation and summer temperature. Their relationship looks random.

Positive (negative) precipiation anomalies during winter could be associated with wetter (drier) soils, a later (earlier) date of snowmelt, cooler (warmer) air temperatures, and more (less) evaporation during spring and summer.