

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 Info  
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.

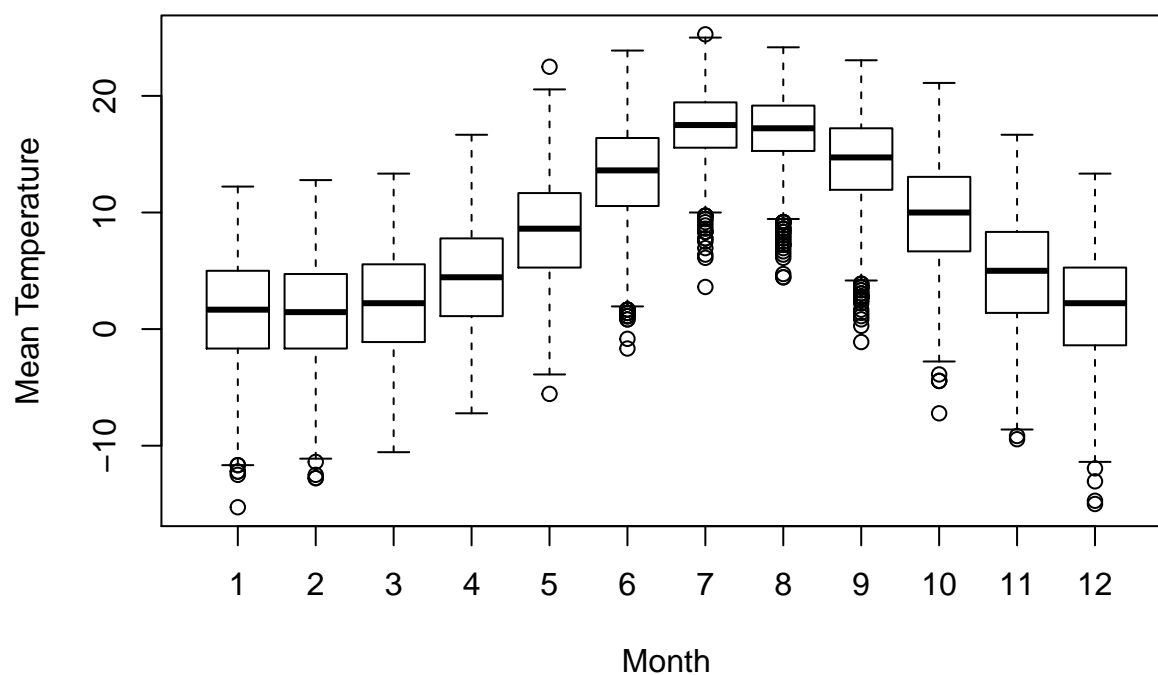
Add a average temperature column to the data.

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

Using boxplot.

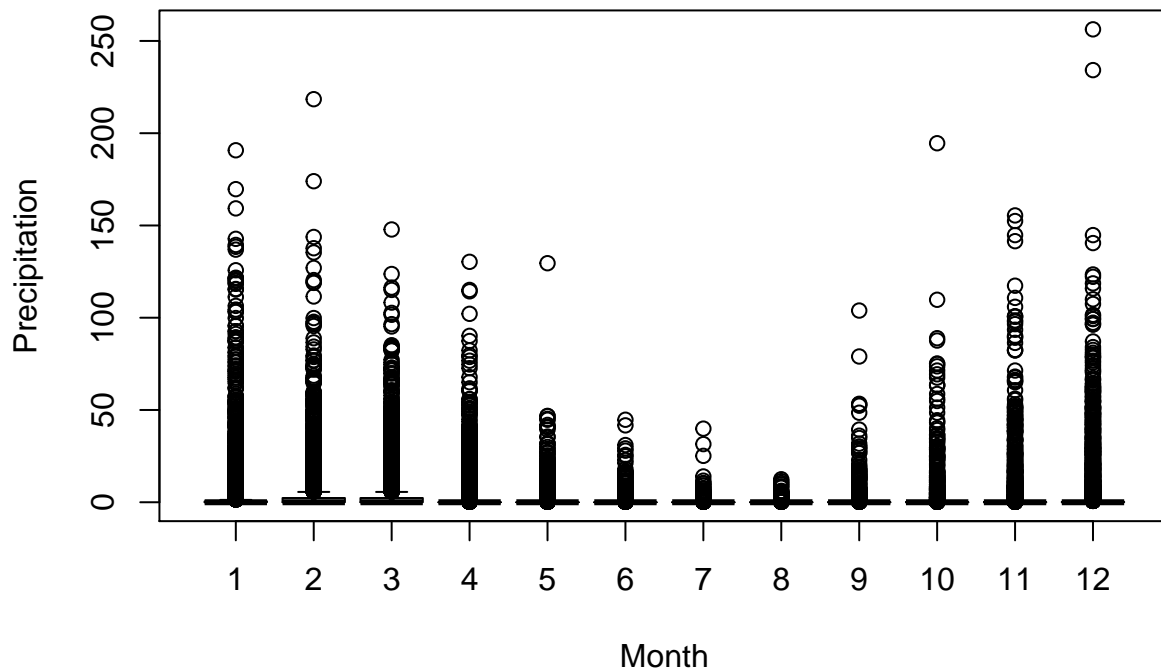
```
boxplot(data = ClimateData, tmean ~ month, main = "Climate Data: Mean Temperature Grouped by Months", xlab = "Month", ylab = "Mean Temperature", col = "red", las = 2)
```

Climate Data: Mean Temperature Grouped by Months



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

Climate Data: Precipitation Grouped by Months



3) Find the wettest and driest 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 driest 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,]
```

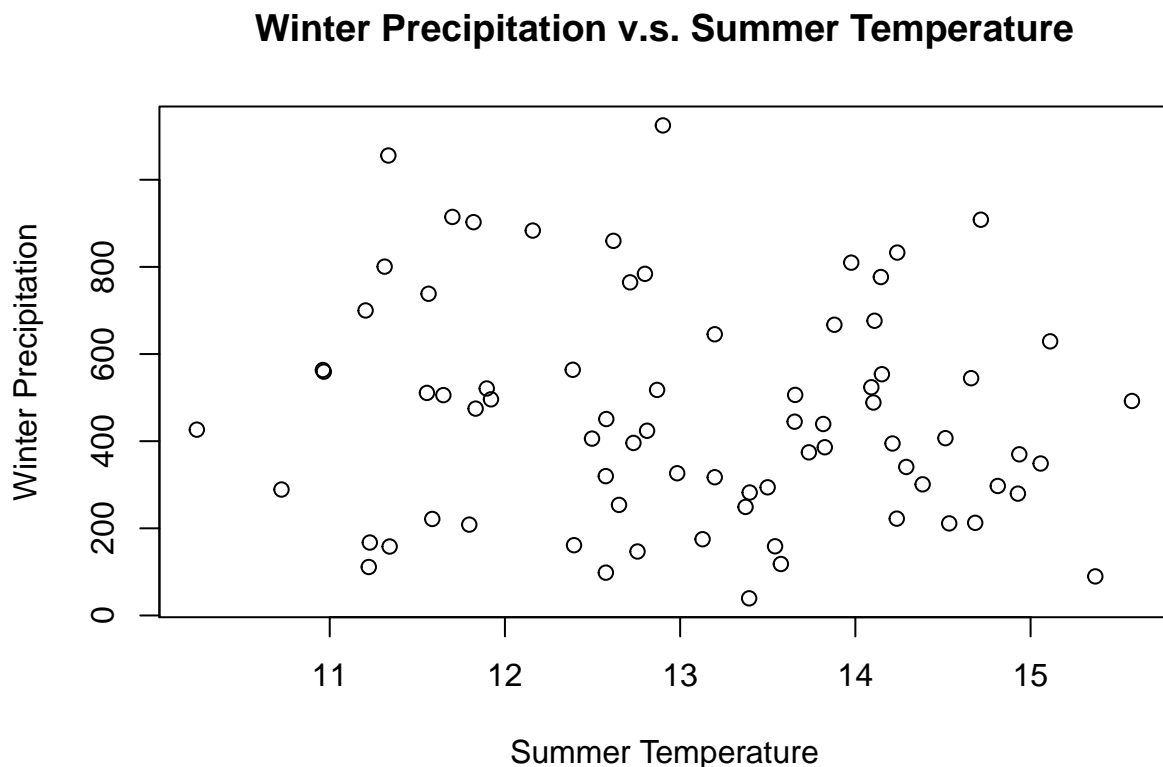
```
##   Group.1      x  
## 2        2 4076.954
```

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

7) Plot the relationship between winter precipitation and summer temperature

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