STAT 443: Lab 2

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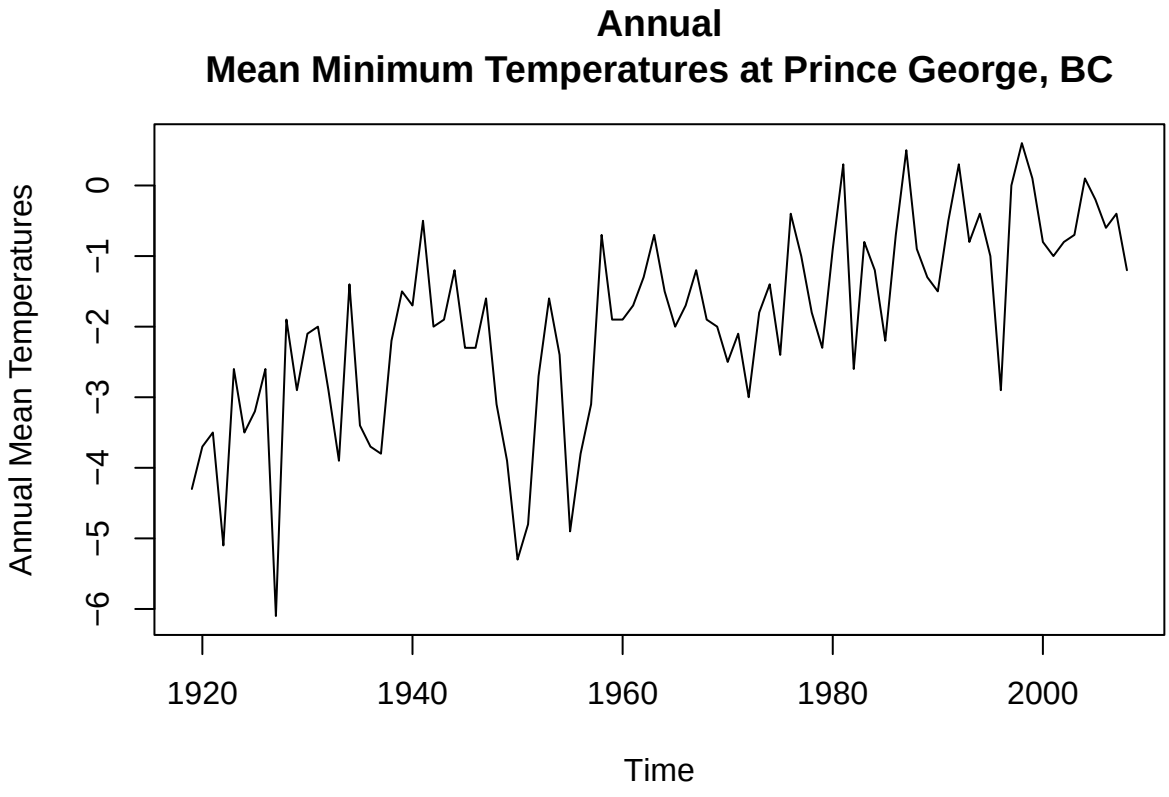
24 January, 2022

Question 1

(a)

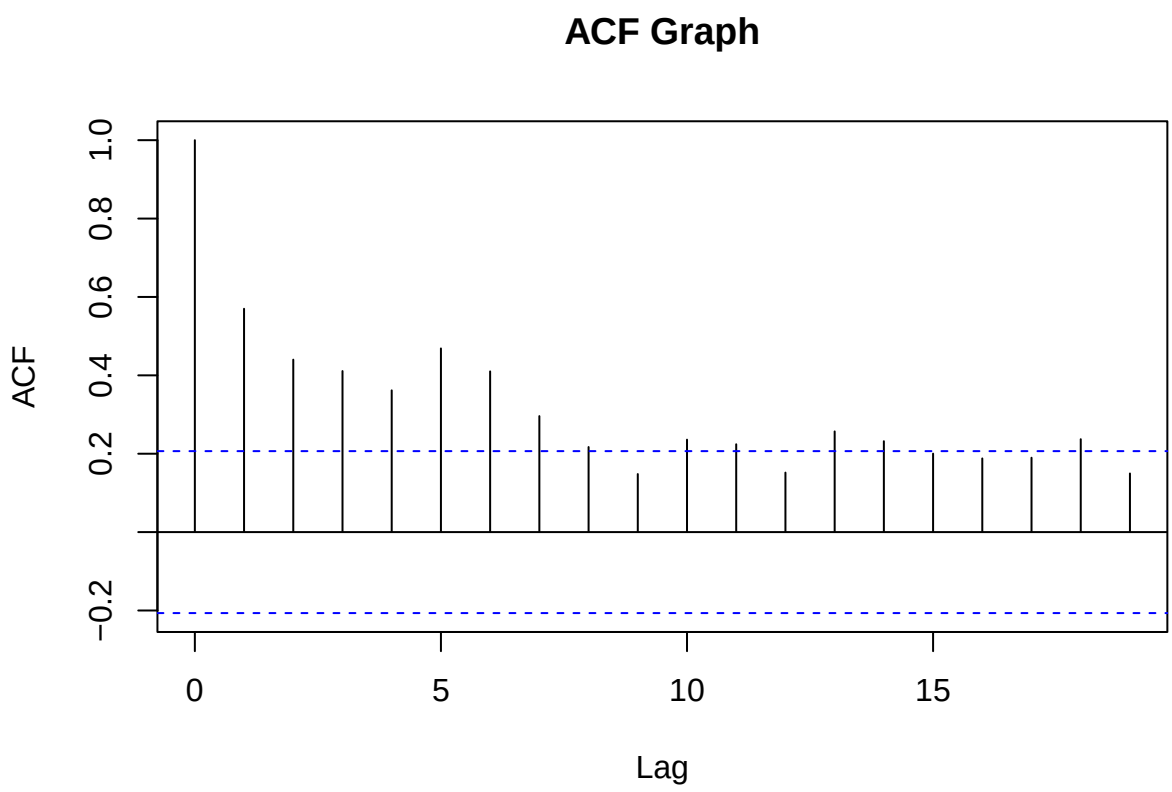
```
# Reading the data
data1 <- read.csv('dataTempPG.csv')

# Making time series object
data1.ts <- ts(data1$Annual, start = c(1919), frequency = 1)

# Plotting
plot(data1.ts, xlab = "Time", ylab= "Annual Mean Temperatures", main = "Annual
Mean Minimum Temperatures at Prince George, BC")
```



The graph shows an upward trend, with no discernible seasonality.

(b)

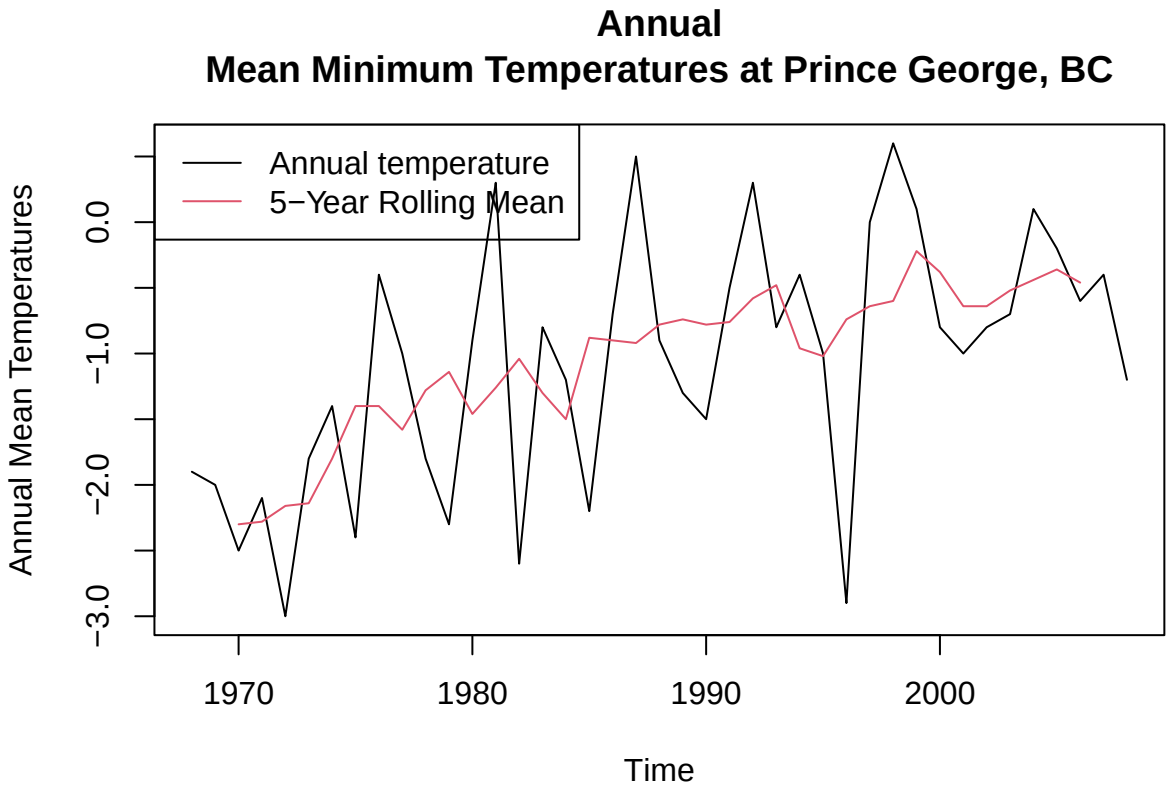
```
# Plotting acf function
data1.tsgrph <- acf(data1.ts, plot = F)
plot(data1.tsgrph, xlab = "Lag", ylab = "ACF", main = "ACF Graph")
```



The ACF graph shows decay from lags 1-4, and then a high value at lag = 5. This means that each value is correlated to its previous value decaying with each lag. Then there is a high correlation between values 5 years apart, which might suggest some sort of seasonality with period 5, however this is not easily discernible from the plot.

(c)

```
# Extracting time series between years 1968 and 2008
data1.ts1 <- window(data1.ts, start = c(1968), end = c(2008))

# Plotting with rolling average and legend
plot(data1.ts1, xlab = "Time", ylab= "Annual Mean Temperatures", main = "Annual
Mean Minimum Temperatures at Prince George, BC")
lines(rollmean(data1.ts1, 5), col = 2)
legend("topleft",legend=c("Annual temperature","5-Year Rolling Mean"), lty=1,col=c(1,2))
```

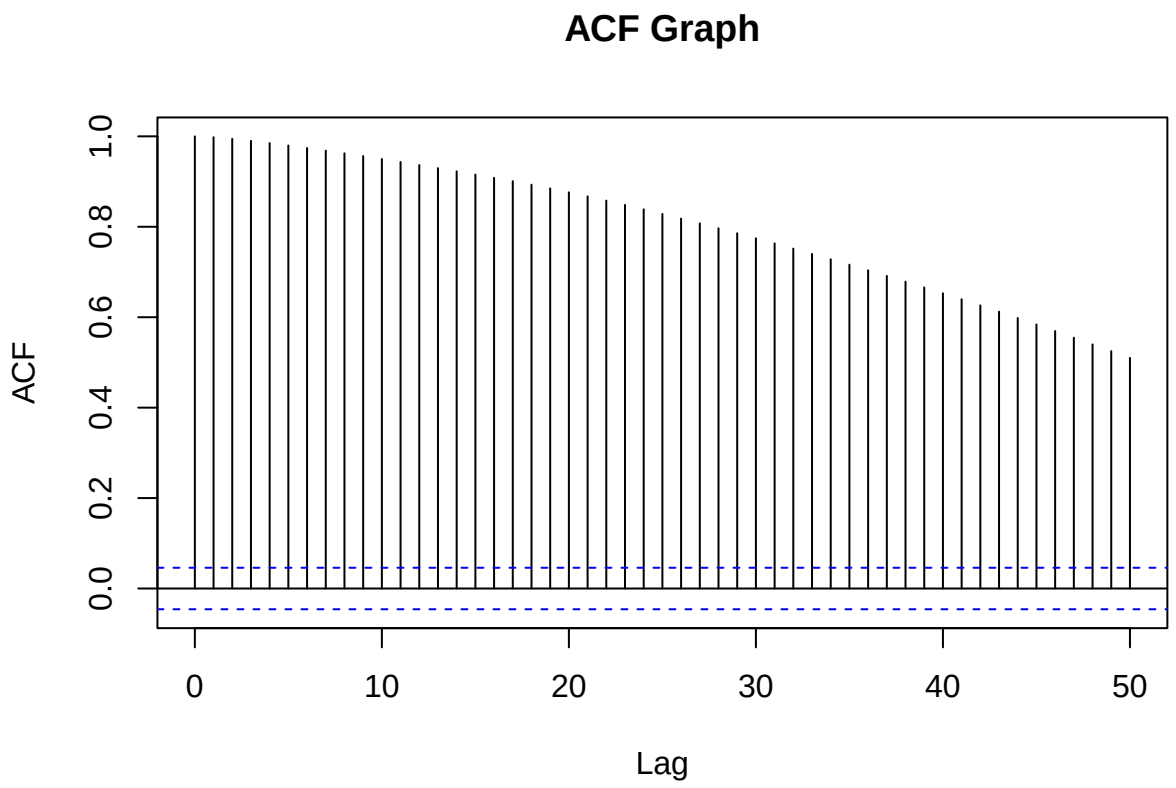


Question 2

```
# Reading data and making time series object
data2 <- read.csv("LakeLevels.csv")
data2.ts <- ts(data2$LakeLevel, start = c(2007, 1), frequency = 365)
```

(a)

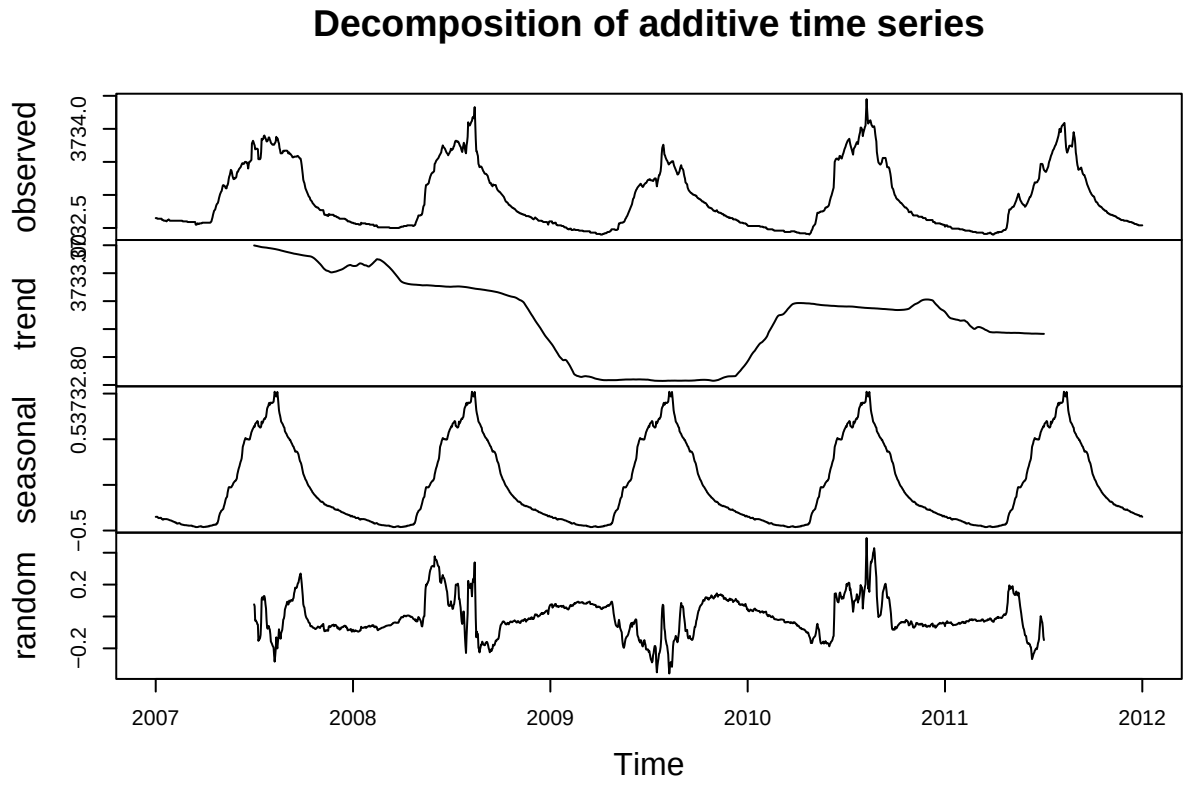
```
# Making acf with daily lags
acf.est <- acf(data2.ts, lag.max = 50, plot = F)
acf.est$lag <- acf.est$lag * 365
plot(acf.est, main = "ACF Graph")
```



The ACF graph shows decaying correlation with each increase in lag. So each data value is less and less correlated with previous value as the lag increases.

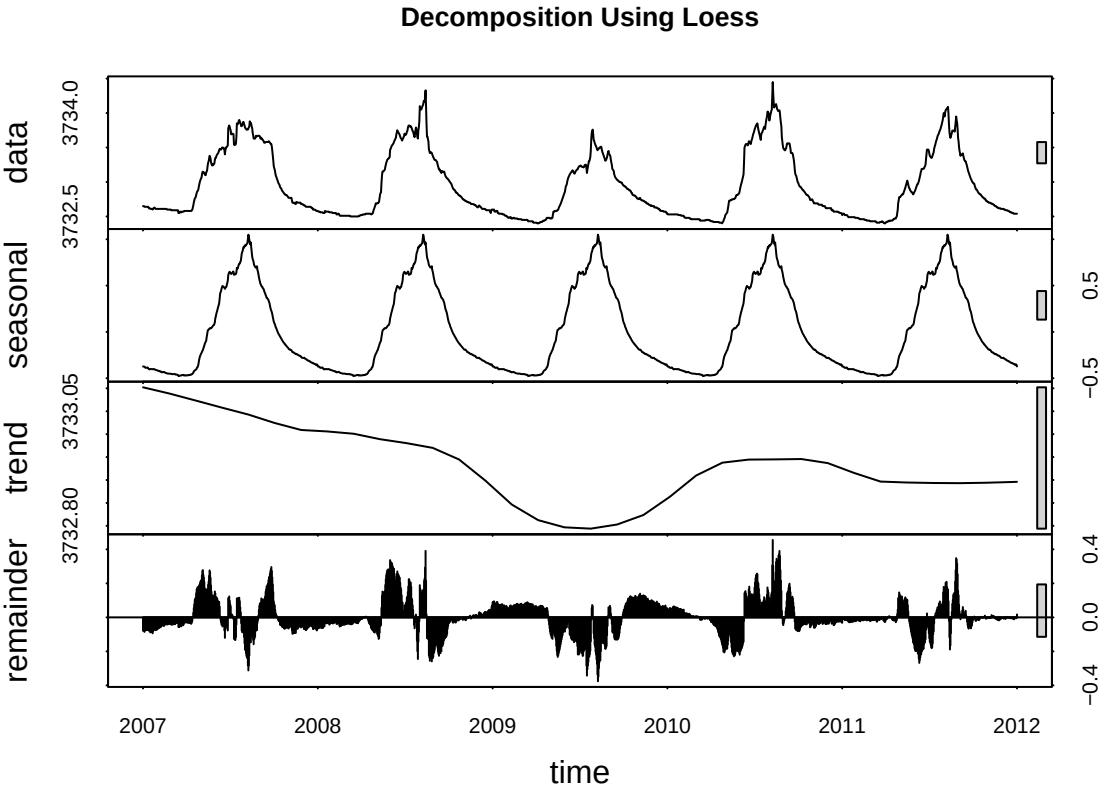
(b)

```
# Plotting using additive seasonal decomposition model
plot(decompose(data2.ts, type = "additive"))
```



(c)

```
# Plotting using Loess smoothing decomposition
plot(stl(data2.ts, s.window = "periodic"), main = "Decomposition Using Loess")
```


Decomposition Using Loess
data
seasonal
trend
remainder
3734.0
3732.5
3733.05
3732.80
0.5
−0.5
0.4
0.0
−0.4
2007
2008
2009
2010
2011
2012
time