DATA315 Assignment 3

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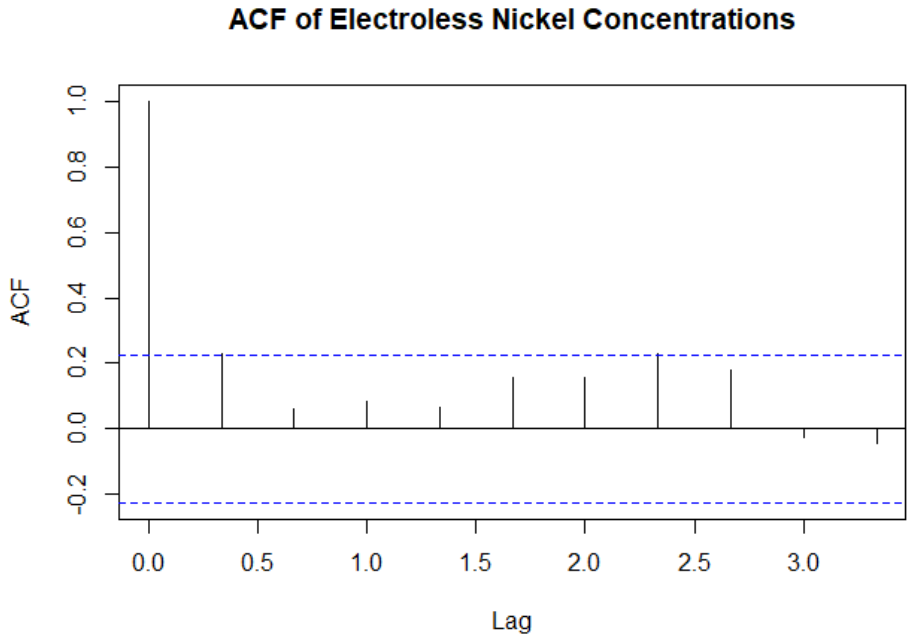
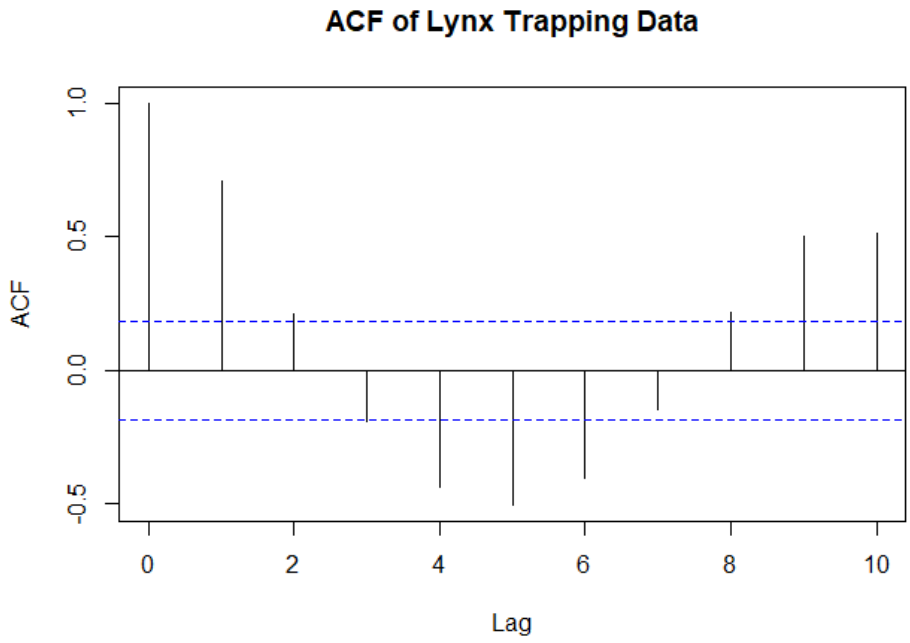
1.
```
source("nickel.R")
acf(nickel, lag.max = 10,
main = "ACF of Electroless Nickel Concentrations")
```



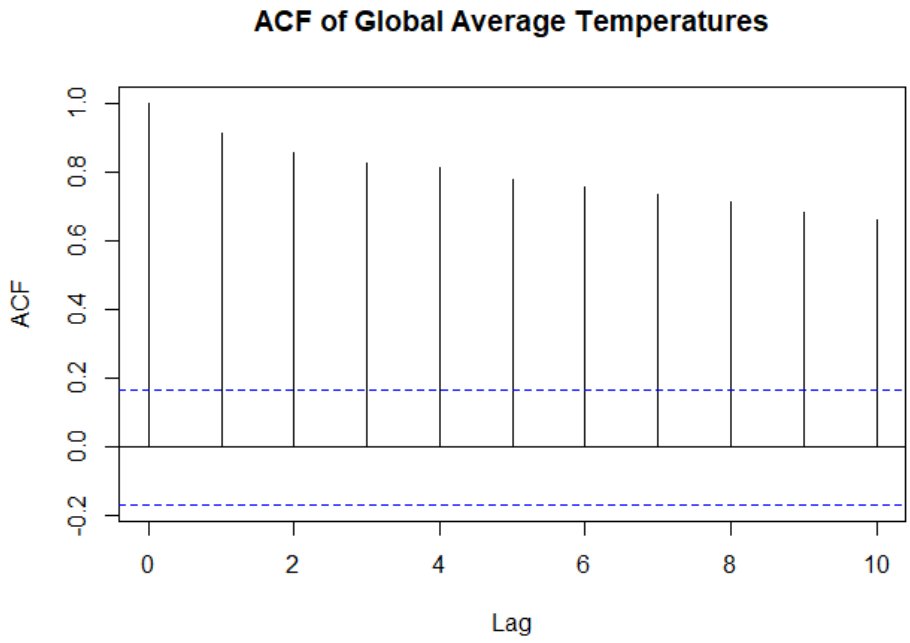
   The ACF plot seems to follow an MA(1) process, as significant correlation at lag 1 followed by immediate drop to near zero.

2.
```
data(lynx)
acf(lynx, lag.max = 10, main = "ACF of Lynx Trapping Data")
```



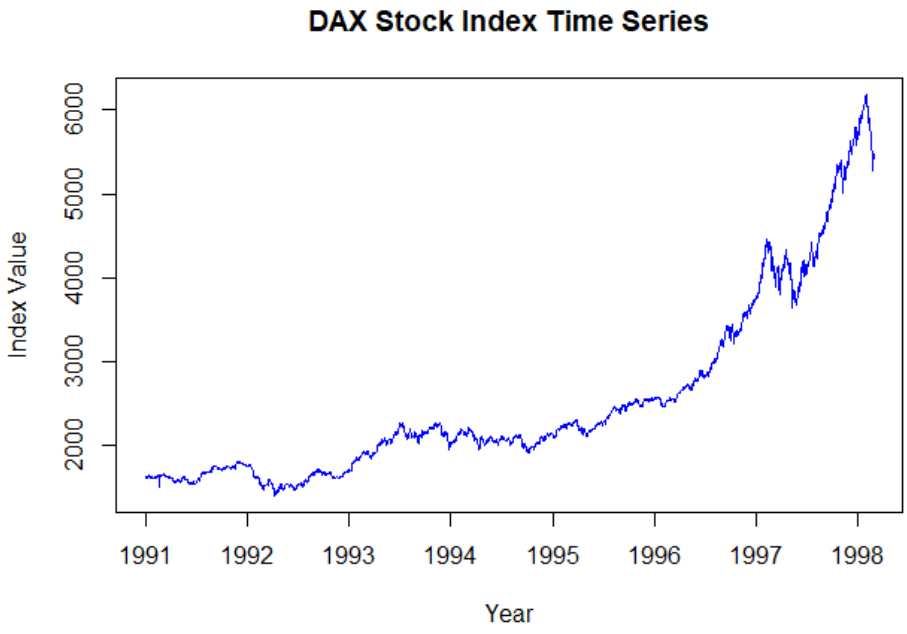
So far, there are no models that fit, because the plot shows a cyclic pattern between predator and prey populations.

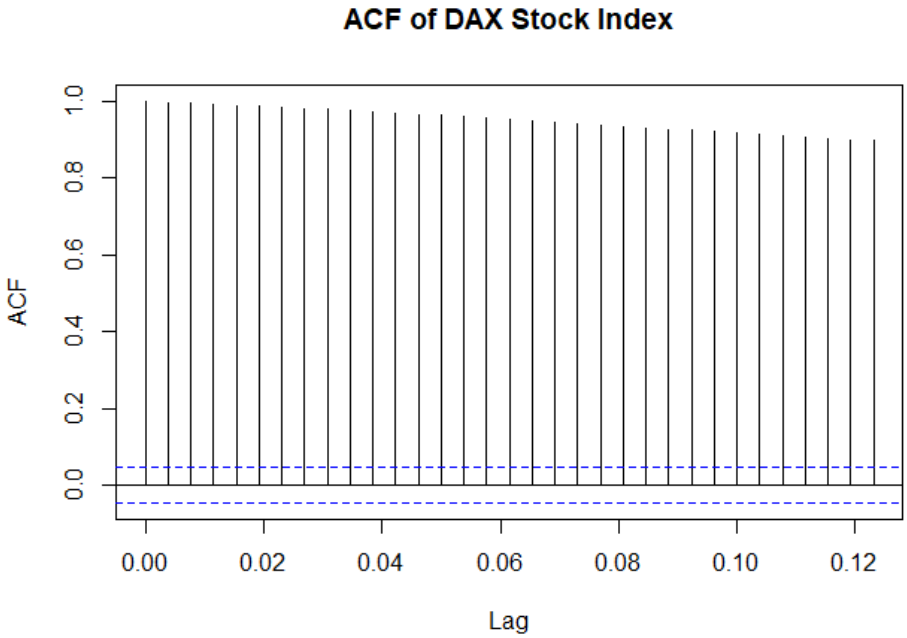
3.
```
source("Globaltemps.R")
temps <- ts(temps, start = 1880, end = 2016)
acf(temps, lag.max = 10,
main = "ACF of Global Average Temperatures")
```

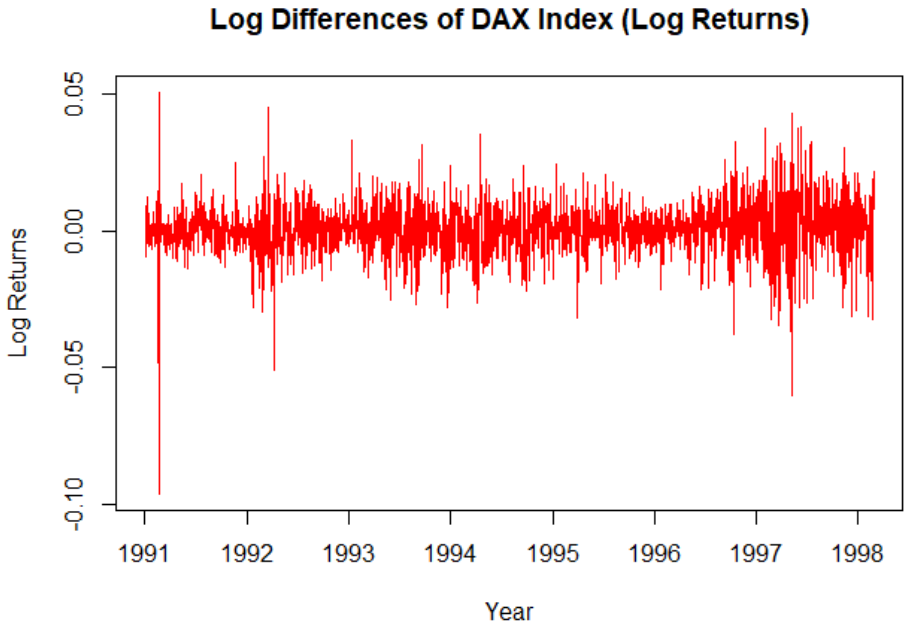


The ACF plot seems to follow an AR(1) process, as significant correlation at lag 1 followed by gradual decay.

4.
```
data("EuStockMarkets")
dax <- EuStockMarkets[, 1]
dax_ts <- ts(dax, start = c(1991, 1), frequency = 260)
# 260 trading days per year

plot(dax_ts,
main = "DAX Stock Index Time Series",
ylab = "Index Value", xlab = "Year",
col = "blue", type = "l") # Time series plot

acf(dax_ts, main = "ACF of DAX Stock Index") # ACF plot

log_dax <- log(dax_ts)          # Take the natural log
diff_log_dax <- diff(log_dax)   # Compute first differences (log returns)
```







Some observations for the DAX stock index time series plot; visually, we can see that there is a general upward trend with some fluctuations. The ACF plot shows that there is a significant correlation at lag 1, followed by a gradual, slow decay, which means that it may be following other process we have not covered yet. The log returns plot shows that the data revolves around 0, which is a good sign for stationarity.