732A62 Lab 3

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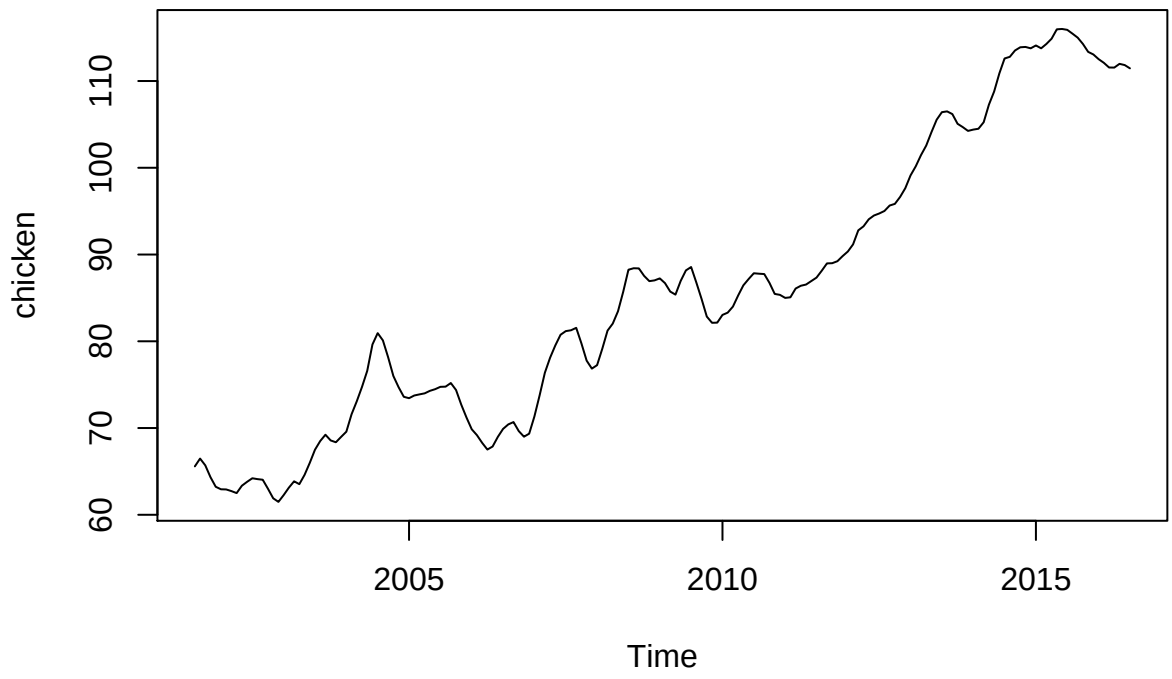
Assignment 1

1)

```
library(astsa)
library(TSA)
library(forecast)

plot(chicken)
```

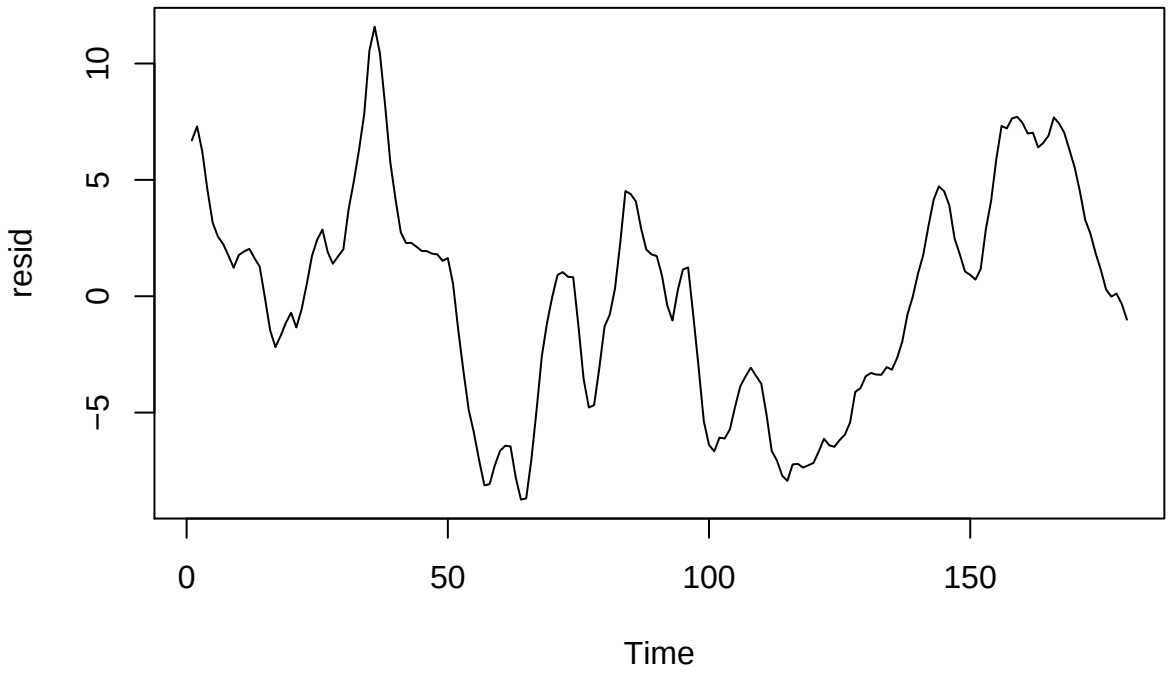


It looks like a linear, potentially quadratic, trend.

2)

```
lm_data <- data.frame(chicken=chicken, time=1:length(chicken))
lm_fit <- lm(chicken ~ time, lm_data)
```

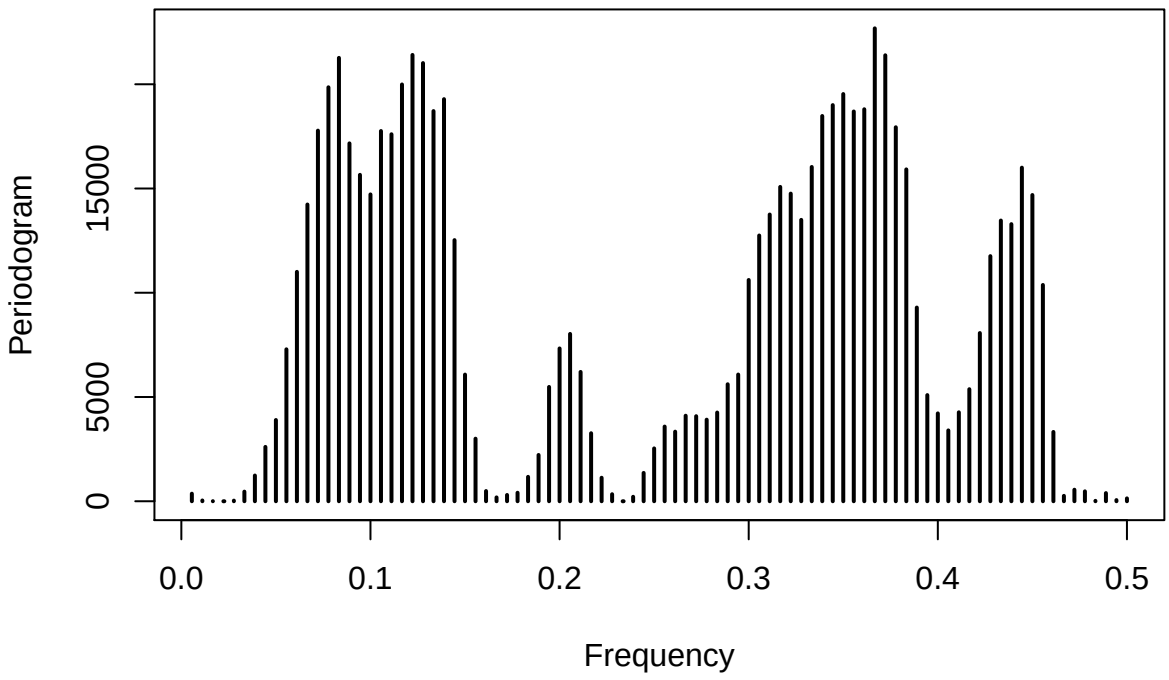
```r
z <- resid(lm_fit)
plot(z, type="l", ylab="resid", xlab="Time")
```



The residuals do not look stationary.

3)

```r
periodogram(fft(z))
```



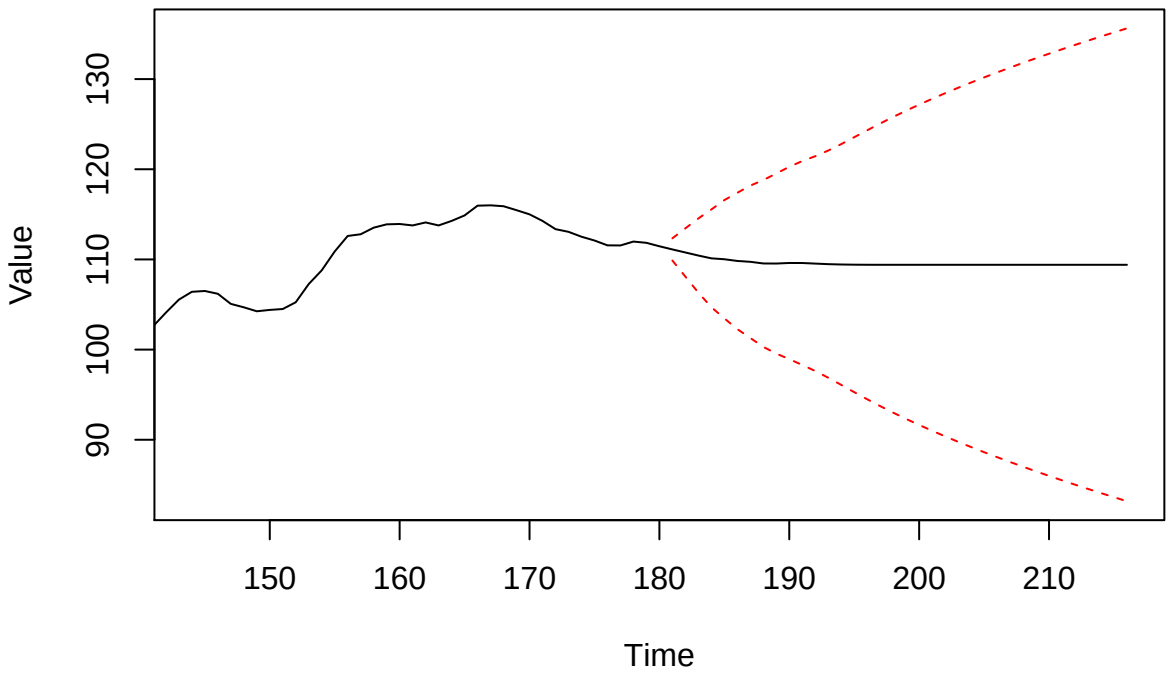
4)

5)

6)

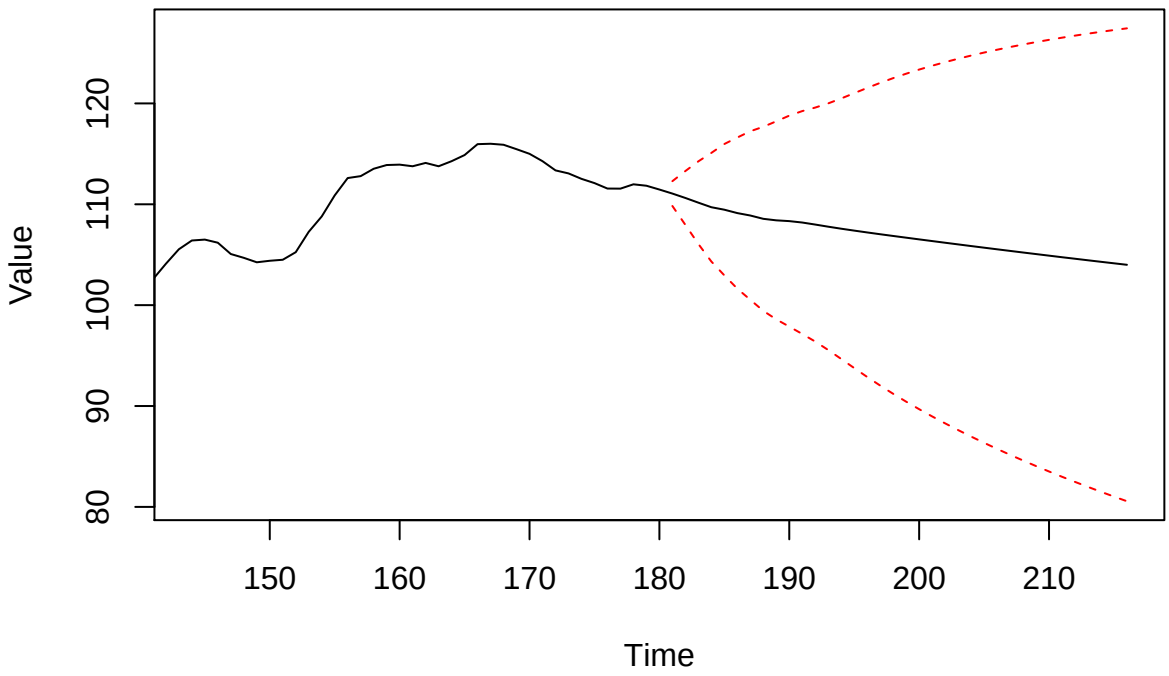
```
fit_plot <- function(model, data) {
    nahead <- 36
    pred <- predict(model, n.ahead=nahead, se.fit=TRUE)
    upper_band <- pred$pred + 1.96 * pred$se
    lower_band <- pred$pred - 1.96 * pred$se

    n <- length(data)

    plot(c(data, pred$pred), type="l",
         xlim=c(n - nahead, n + nahead),
         ylim=c(min(lower_band), max(upper_band)), ylab="Value", xlab="Time")
    lines(n + 1:nahead, upper_band, lty=2, col="red")
    lines(n + 1:nahead, lower_band, lty=2, col="red")
}
```

```
fit <- arima(chicken, order=c(2, 1, 0), seasonal=list(order=c(0, 0, 1), period=12))
fit_plot(fit, chicken)
```



7)

```
fit <- arima(chicken, order=c(3, 0, 0), seasonal=list(order=c(0, 0, 1), period=12))
fit_plot(fit, chicken)
```


Value
80
90
100
110
120
150
160
170
180
190
200
210
Time

Assignment 2

1)

2)

3)

4)

5)

6)