Lab 6

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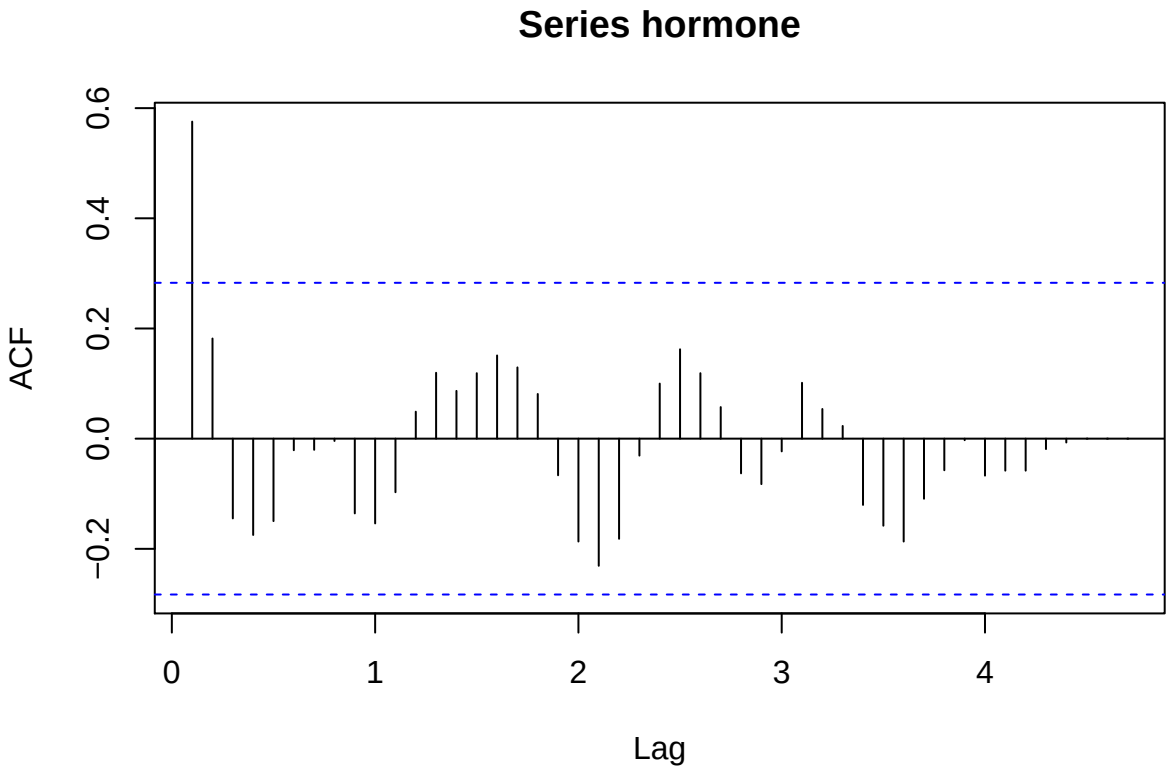
Consider the luteinizing hormone (data(lh) from library(datasets)) in blood samples at 10min intervals from a human female, 48 samples. Is the pattern of the ACF consitent with a stationary AR model?

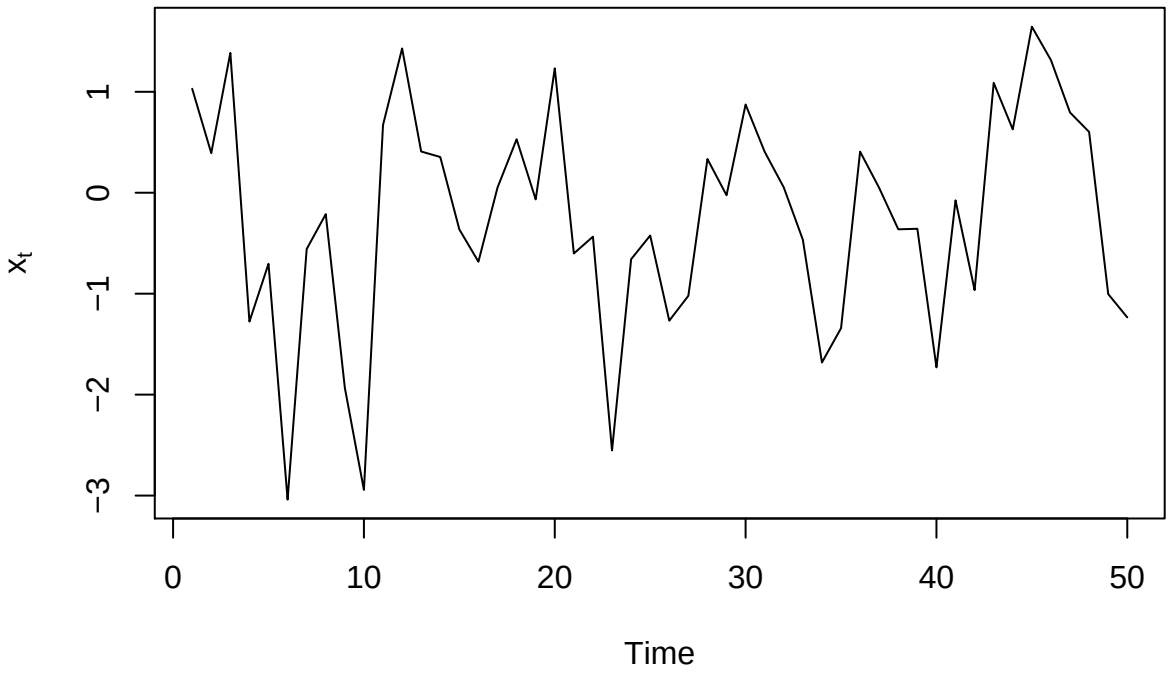
```
hormone = ts(lh, frequency = 10)
acf(hormone, lag.max = "m")
```



The pattern is consistent with stationarity as it decay gradually drops to zero as lag increases

Simulate an AR(3) using n = 50 and the coefficients = c(0.64, -0.06, -0.22). Using the coefficients, is this a stationary AR(3)? Compare the theoretical ACF with the ACF of the luteinizing hormone data. Observations?

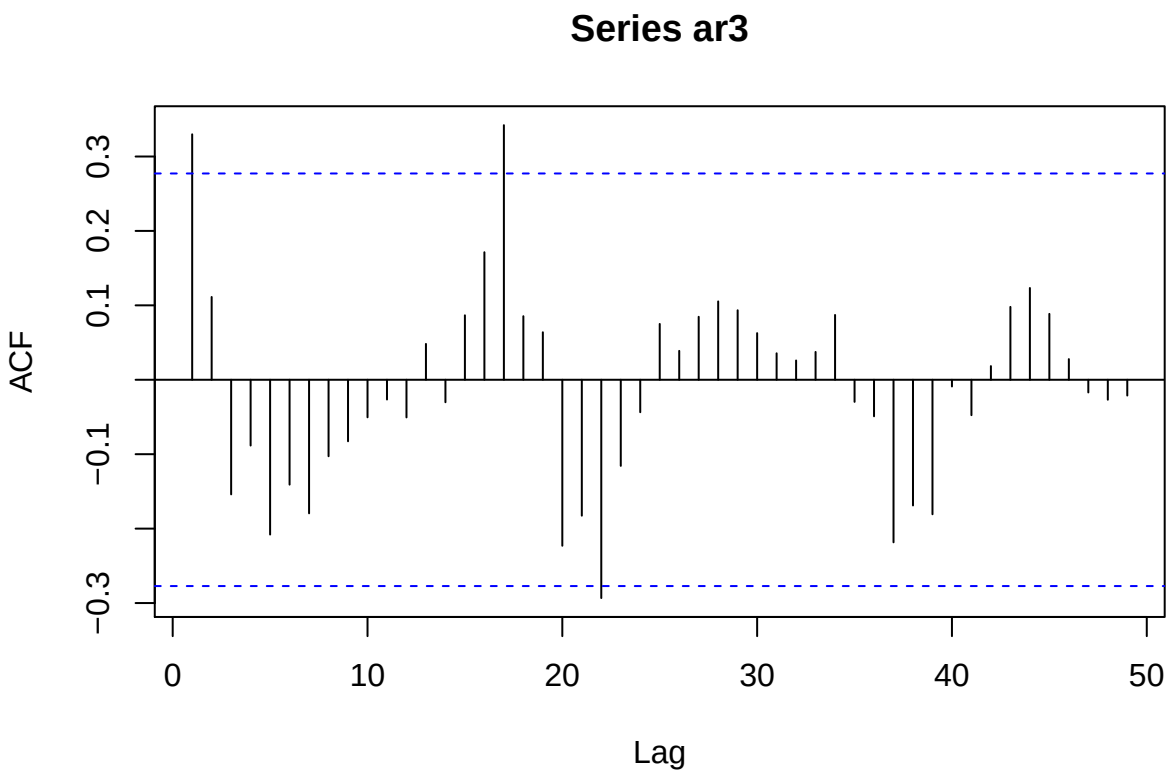
```
ar3 <- arima.sim(list(order = c(3,0,0), ar = c(0.64, -0.06, -0.22)), n = 50)
plot(ar3,ylab=expression(x[t]),xlab="Time",type="l")
```



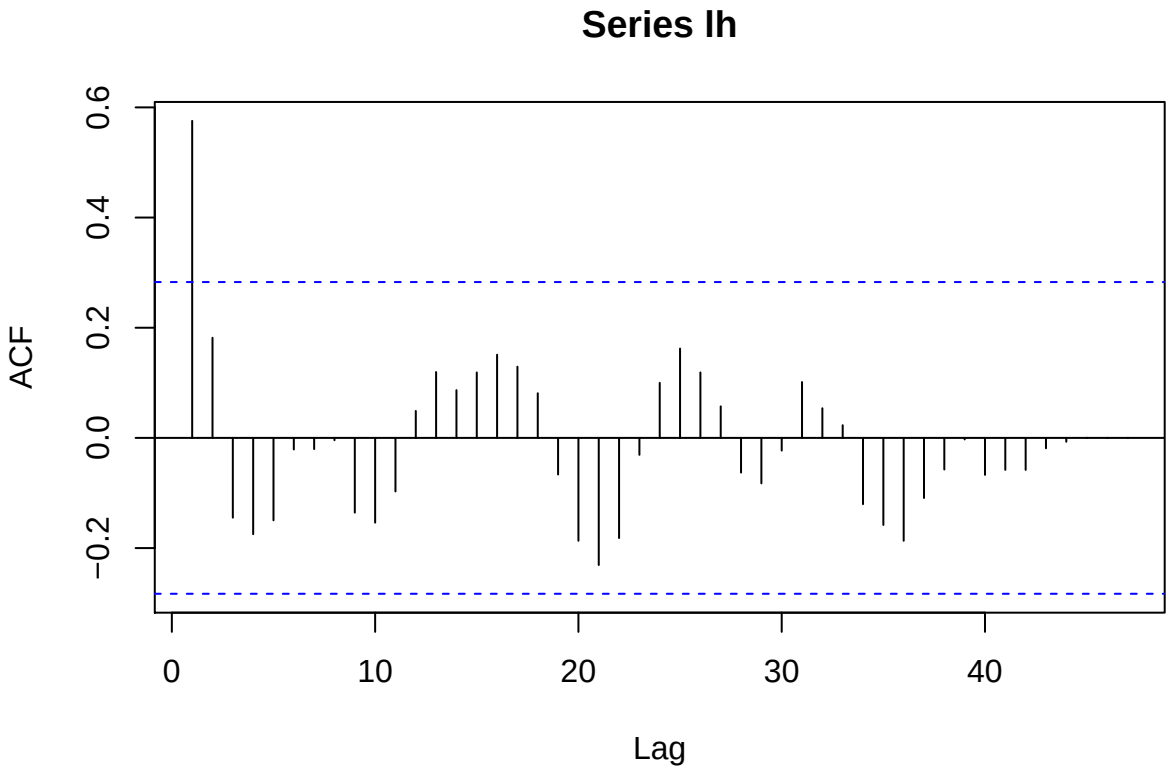

```
z = c(0.64, -0.06, -0.22)
Mod(polyroot(z))
```

```
## [1] 1.574685 1.847412
```

```
# comparing acf's
acf(ar3,lag.max = "m")
```



```r
acf(lh, lag.max = "m")
```



Yes AR(3) model

$$x_t = 0.64x_{t-1} - 0.06x_{t-2} - 0.22x_{t-2} + w_t$$

is stationary since all its roots has magnitude greater than 1.

Both data shows stationarity but the luteinizing hormone data decays faster than the AR(3) model.