Assignment 05; STAT 626

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Question 3.19

Plot theoretical ACF of SARIMA(0, 0, 1) x (1,0,0)12.
PHI = 0.8, theta=0.5. lags=50

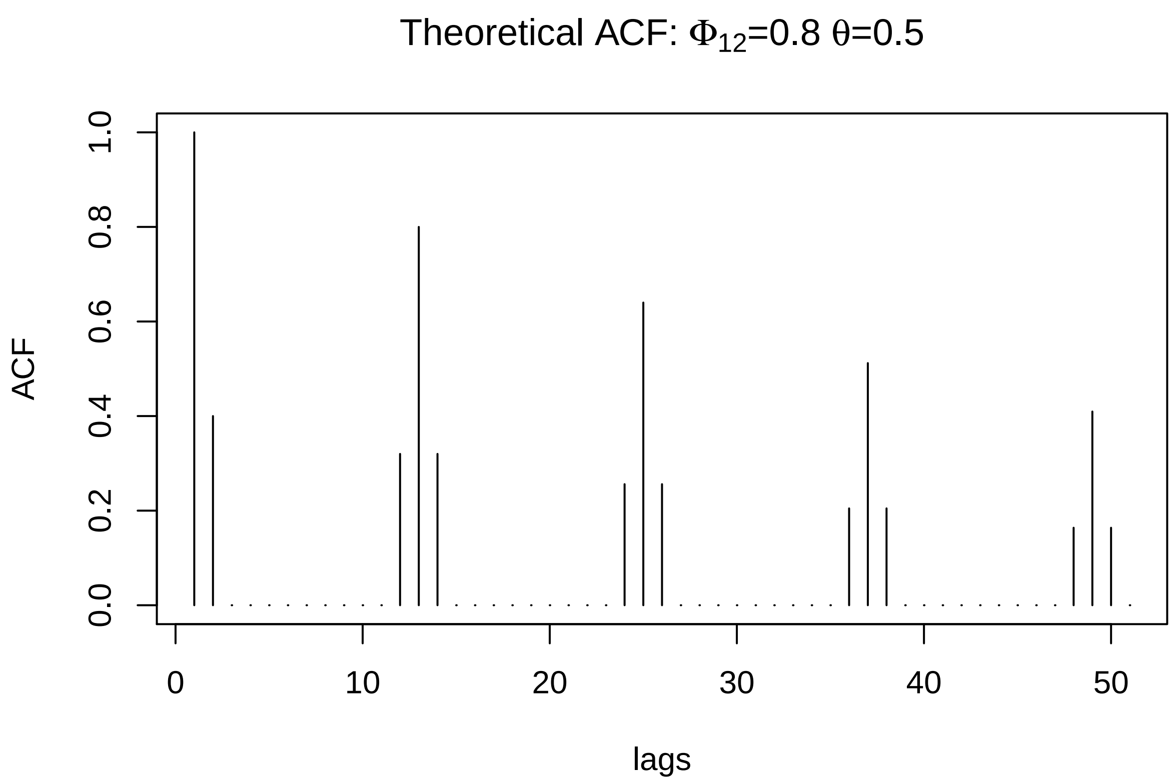
```
(phi <- c(rep(0, 11), 0.8))
```

```
##  [1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.8
```

```
paste0("phi length: ", length(phi))
```

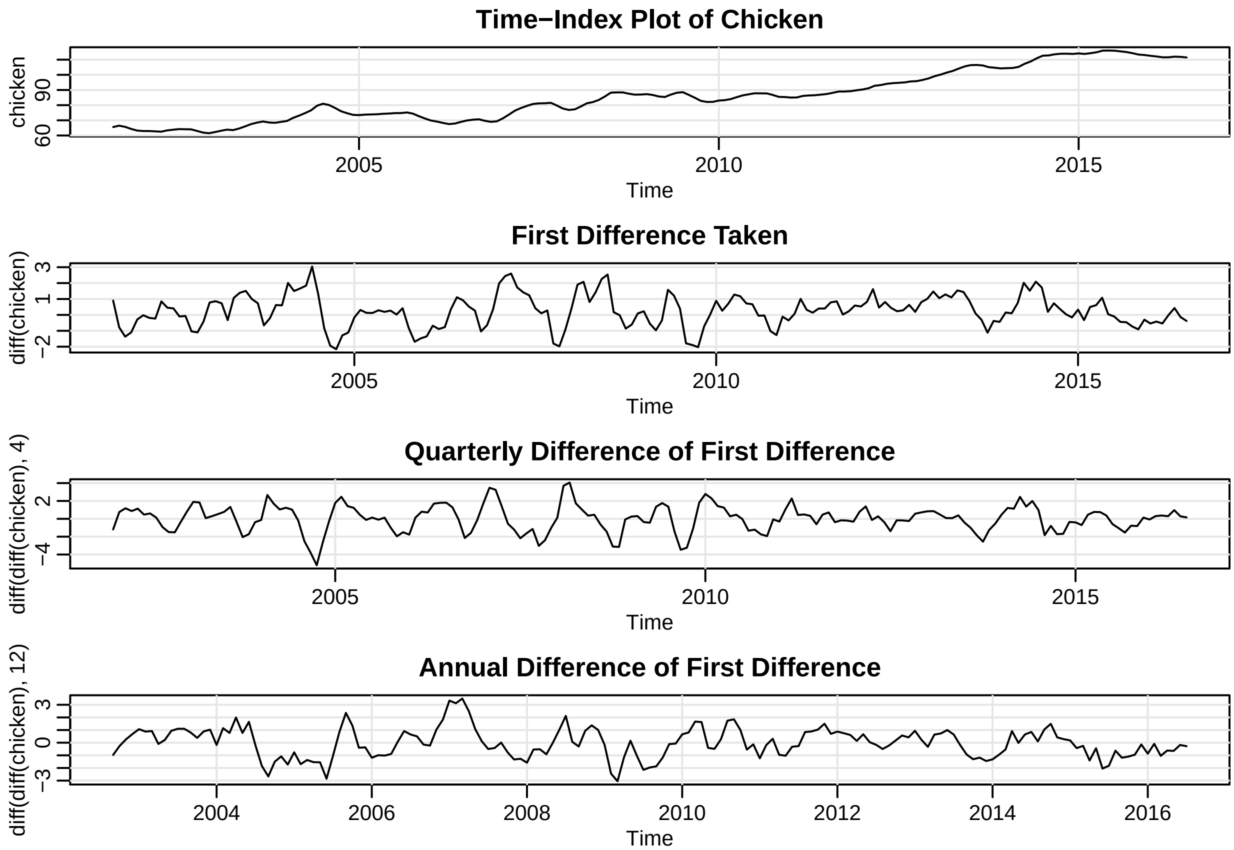
```
## [1] "phi length: 12"
```

```
ACF <- ARMAacf(ar=phi, ma=0.5, lag.max=50)
plot(ACF, type="h"
     , xlab="lags"
     , main=expression(paste("Theoretical ACF: ", Phi[12], "=0.8 ", theta, "=0.5")))
```

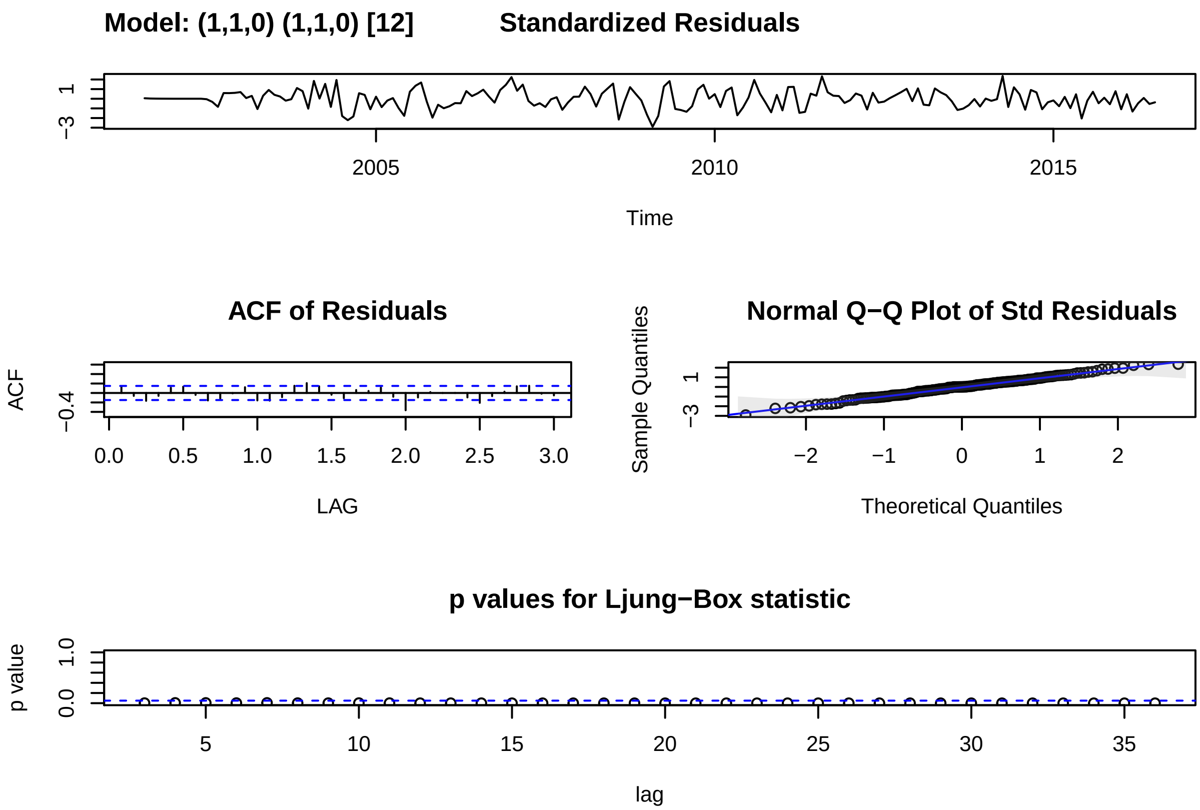


Question 3.20

```r
# first plot the
par(mfrow=c(4,1))
astsa::tsplot(chicken, main="Time-Index Plot of Chicken")
astsa::tsplot(diff(chicken), main="First Difference Taken")
astsa::tsplot(diff(diff(chicken), 4), main="Quarterly Difference of First Difference")
astsa::tsplot(diff(diff(chicken), 12), main="Annual Difference of First Difference")
```



From the above ACFs+PACFs, it appears that annual differencing is a good option. The final ACF+PACF combination shows a tailing off in the ACF, but a cut-off in the PACF at the seasonal lags. This suggests that a suitable model may be SAR(1), P=1, Q=0 in S=12, or SARIMA(1,1,0)x(1,1,0)_12.


Model: (1,1,0) (1,1,0) [12]
Standardized Residuals
−3
1
2005
2010
2015
Time
ACF of Residuals
ACF
−0.4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LAG
Normal Q−Q Plot of Std Residuals
Sample Quantiles
−3
1
−2
−1
0
1
2
Theoretical Quantiles
p values for Ljung−Box statistic
p value
0.0
1.0
5
10
15
20
25
30
35
lag