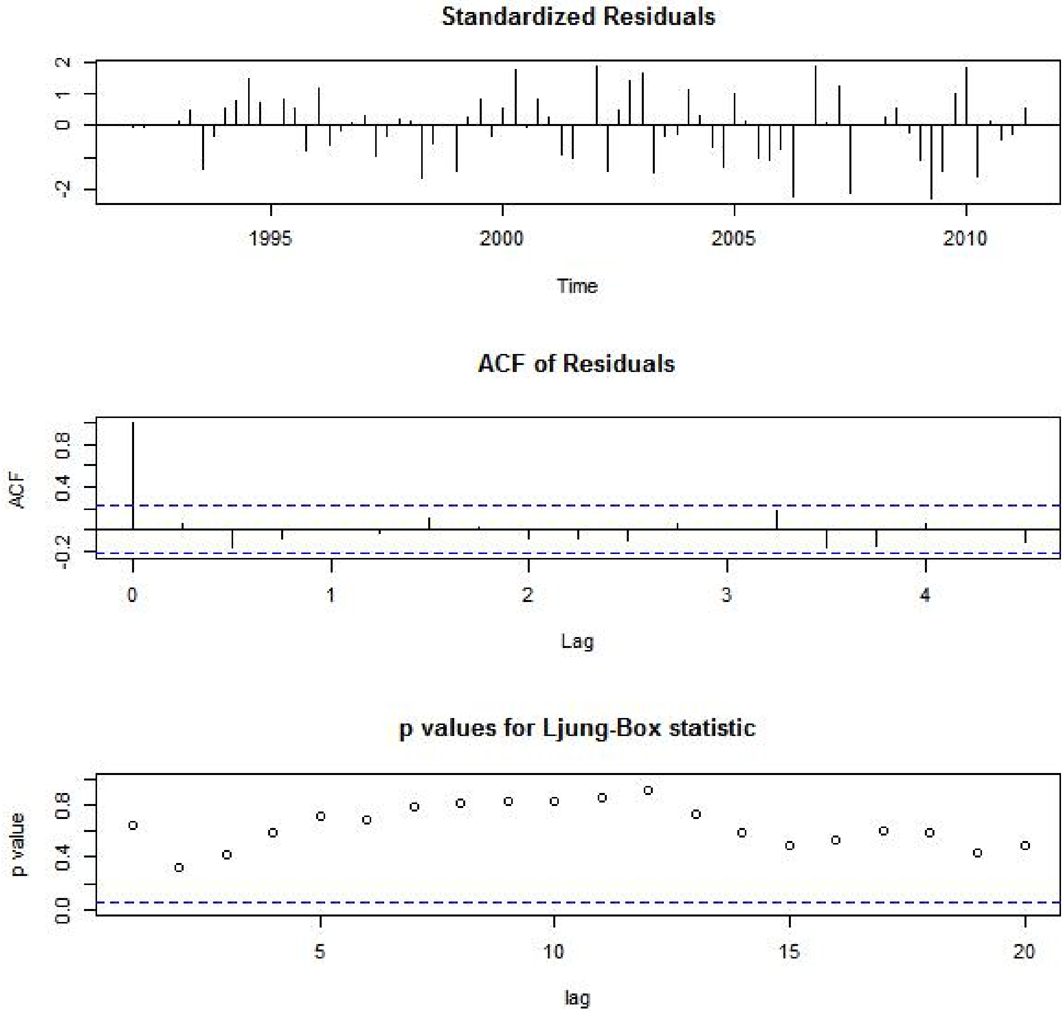
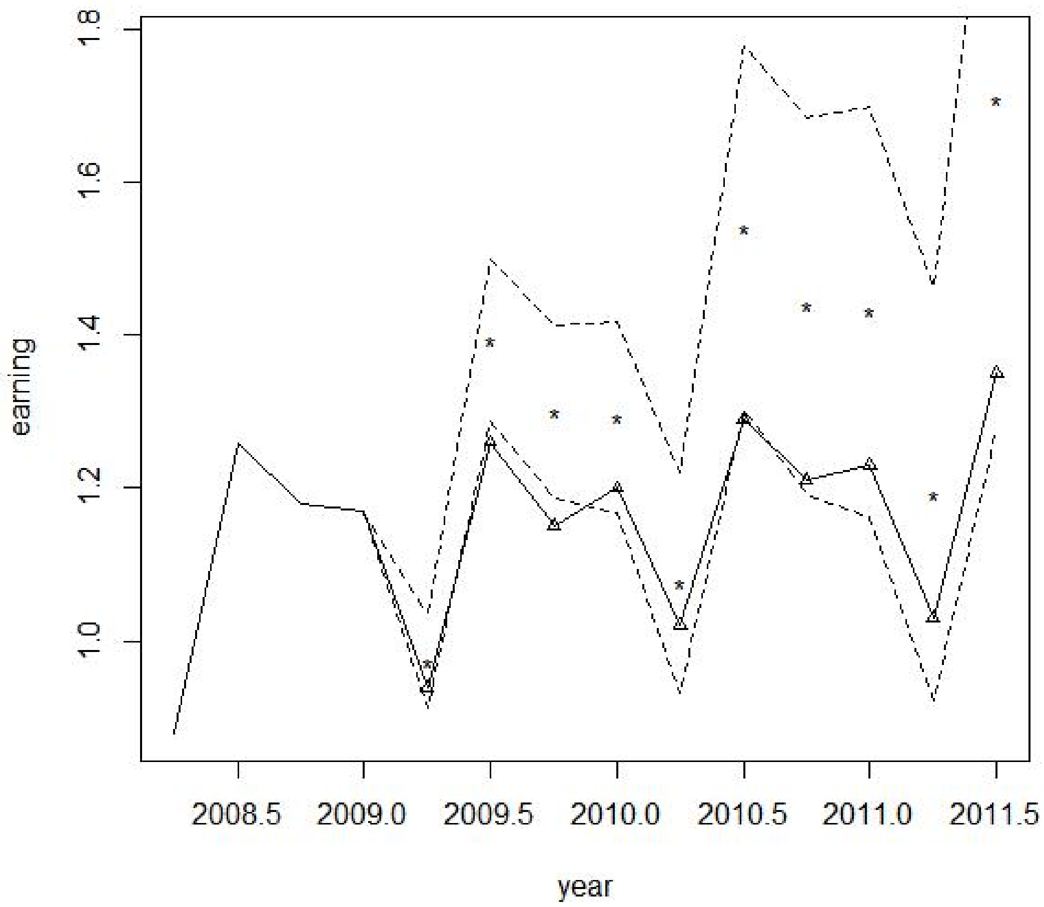
(a-2-7)

Set X(t) as the earns, use the log transformation of the date we get $Y(t) = \log(X(t))$,As a result,

We could get the fitted model is $(1-B)(1-B^4)Y(t) = (1-0.3223B)(1-0.2175B^4)a(t)$,



And Box test we get the date,
mn4$residuals
X-squared = 19.386, df = 20, p-value = 0.4969.
The p-value >0.05. So this model is adequate.
As a result, we try to use it to predict the values.
The 10 predict values is [1] -0.0269 0.3306 0.2616 0.2557 0.0713 0.4289 0.3599 0.3540 0.16960 0.5271.



Code:

```
da=read.table('D:/timeseries/q-jnj-earns-9211.txt',header=T)
head(da)
mn1=log(da$earns)
length(mn1)
mn1=ts(mn1,frequency=4,start=c(1992,1))
plot(mn1,type='l')
points(mn1,pch=8,cex=0.6)
mn2=diff(mn1,4)
mn3=diff(mn2)
acf(mn3,lag=20)
mn4=arima(mn1,order=c(0,1,1),seasonal=list(order=c(0,1,1),period=4))
mn4
tsdiag(mn4,gof=20)
Box.test(mn4$residuals,lag=20,type='Ljung')
y=mn1[1:68]
head(y)
```

```
tail(y)
mn5=arima(y,order=c(0,1,1),seasonal=list(order=c(0,1,1),period=4))
mn5
pm1=predict(mn5,10)
pm1
names(pm1)
pred=pm1$pred
se=pm1$se
ko=da$earns
fore=exp(pred+se^2/2)
v1=exp(2*pred+se^2)*(exp(se^2)-1)
s1=sqrt(v1)
eps=ko[65:78]
tdx=c(1:14)/4+2008
upp=c(ko[68],fore+2*s1)
low=c(ko[68],fore-2*s1)
min(low,eps)
max(upp,eps)
plot(tdx,eps,xlab='year',ylab='earning',type='l',ylim=c(0.88,1.78))
points(tdx[5:14],fore,pch='*')
lines(tdx[4:14],upp,lty=2)
lines(tdx[4:14],low,lty=2)
points(tdx[5:14],ko[69:78],pch=24,cex=0.7)
```

(a-3-1)

(1)

Here is the fitted model:

$$(1+0.84B^{12})(1-0.85B)(1-B)x(t)=(1-0.29B+0.33B^{2}+0.09B^{4}-0.08B^{5})(1+0.9B^{12})a(t)$$

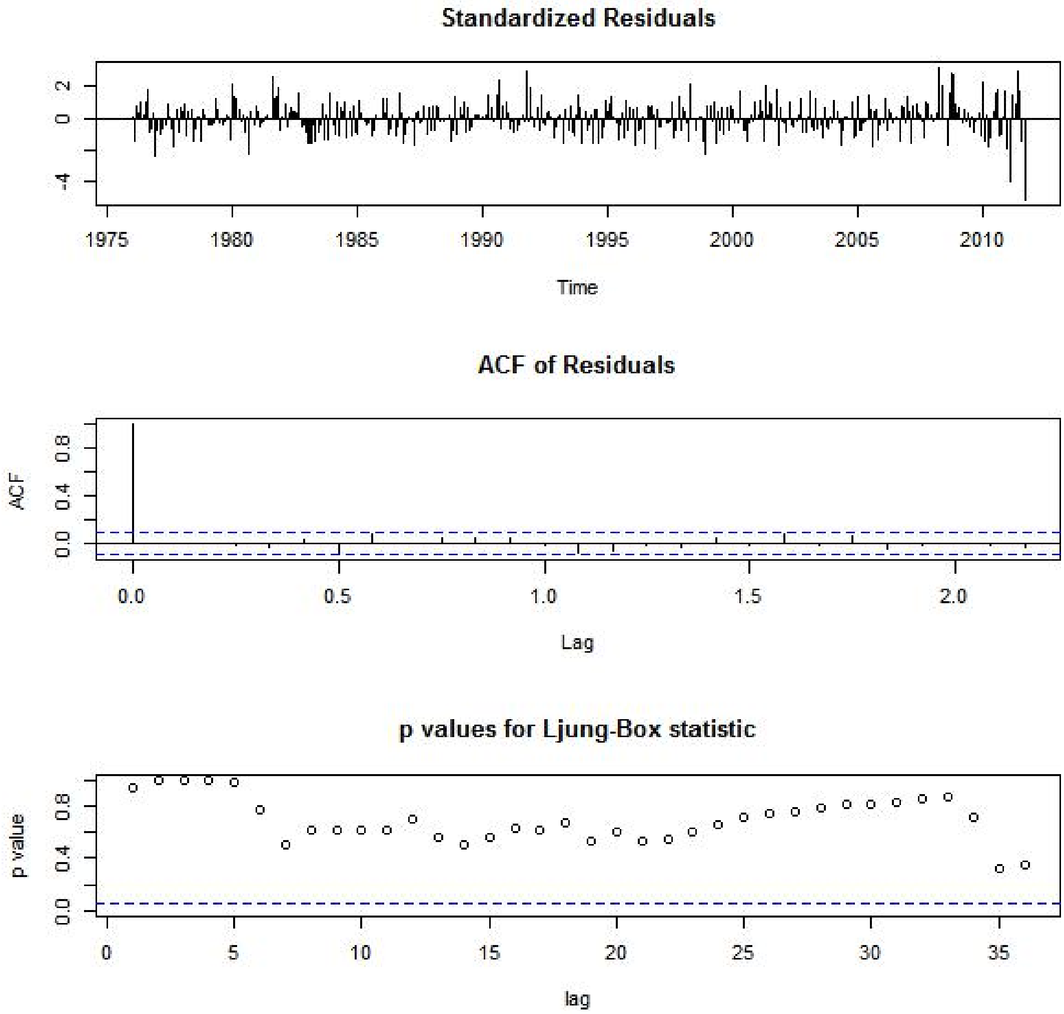
Since the box test for the residuals is

m1$residuals

X-squared = 38.638, df = 36, p-value = 0.3513.

And the P-value for all the number is bigger than 0.05.

As a result, this model is adequate.

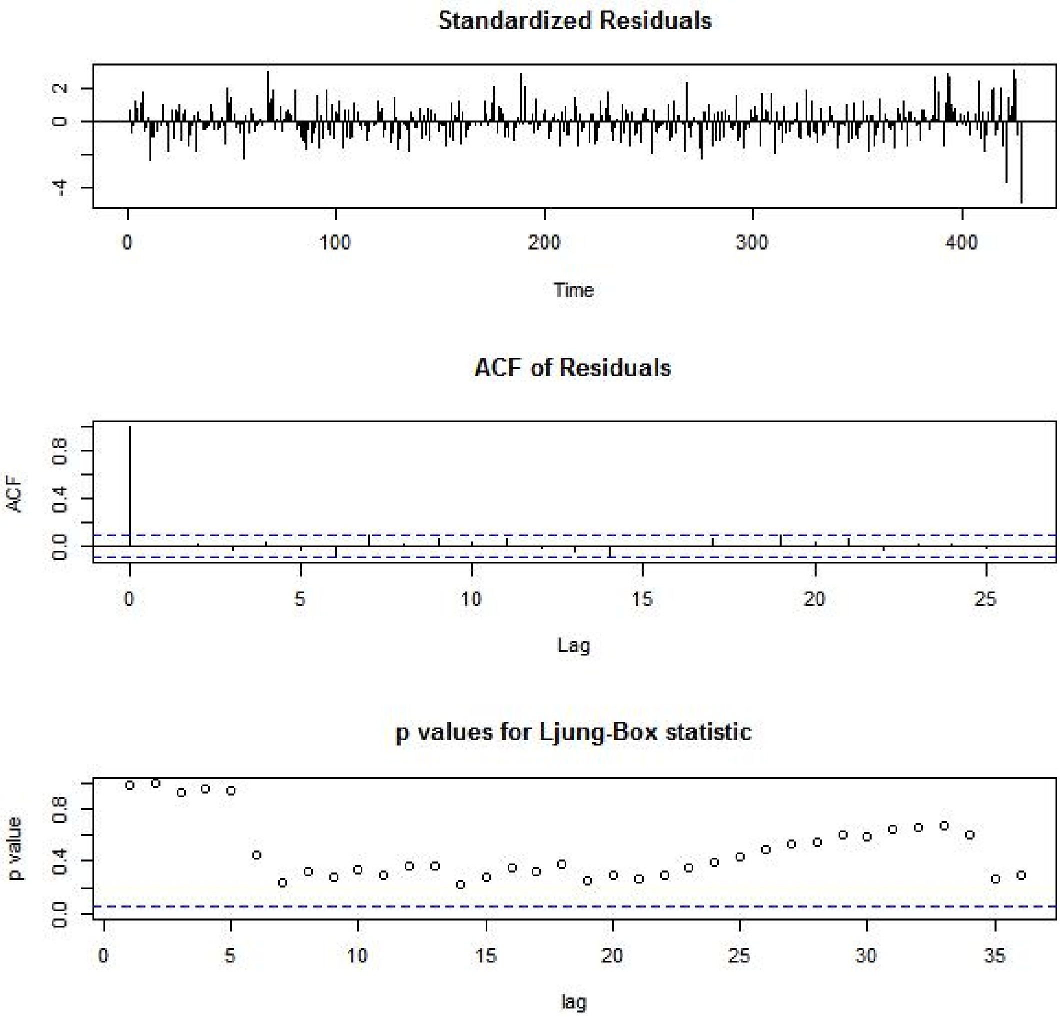


(2)

Here is the model: Since we are using the lag-1 value, so:

$$(1-1.87B+0.87B^2)(1+0.82B^{12})(x(t)-7.35-0.04y(t-1))=(1-0.34B+0.29B^2)(1-0.82B^{12})a(t)$$

And it is adequate, since



(3)

The predict values of (1) is

```
[1] 0.06244375 0.10938611 0.17873329 0.25649540 0.34455084 0.43176487
 [7] 0.51741735 0.60099894 0.68219578 0.76084088 0.83687125 0.91029516
[13] 0.98112347 1.04947394 1.11543751 1.17913847 1.24069617 1.30024137
[19] 1.35789464 1.41377140 1.46798109 1.52062676 1.57180493 1.62160566
[25] 1.67011403 1.71740699 1.76355708 1.80863080 1.85268996 1.89579136
[31] 1.93798778 1.97932808 2.01985748 2.05961794 2.09864831 2.13698470
[37] 2.17466056 2.21170708 2.24815326 2.28402611 2.31935085 2.35415101
[43] 2.38844860 2.42226421 2.45561714
```

Code:

```
da=read.table('D:/timeseries/m-CAUS-7611.txt',header=T)
head(da)
tail(da)
dim(da)
```

```
unemp=da$CA
unrate=ts(unemp,frequency=12,start=c(1976,1))
plot(unrate,xlab='year',ylab='unemp',type='l')
par(mfcol=c(2,2))
acf(unemp,lag=36)
pacf(unemp,lag=36)
acf(diff(unemp),lag=36)
pacf(diff(unemp),lag=36)
m1=arima(unemp,order=c(1,1,5),seasonal=list(order=c(1,0,1),period=12))
m1
c1=c(NA,NA,NA,0,NA,NA,NA,NA)
m1=arima(unemp,order=c(1,1,5),seasonal=list(order=c(1,0,1),period=12),fixed=c1)
m1
tsdiag(m1,gof=36)
Box.test(m1$residuals,lag=36,type='Ljung')

uunemp=da$US[1:428]
unemp=unemp[2:429]
nm1=lm(unemp~uunemp)
summary(nm1)
par(mfcol=c(2,1))
acf(nm1$residuals,lag=36)
pacf(nm1$residuals,lag=36)

nm1=arima(unemp,order=c(2,0,2),seasonal=list(order=c(1,0,1),period=12),xreg=uunemp)
nm1
tsdiag(nm1,gof=36)

m1=arima(unemp[1:384],order=c(1,1,5),seasonal=list(order=c(1,0,1),period=12),fixed=c1)
m1
pm1=predict(m1,45)
pm1
ounemp=unemp[2:384]
ouunemp=uunemp[1:383]
nm1=arima(ounemp,order=c(2,0,2),seasonal=list(order=c(1,0,1),period=12),xreg=ouunemp)
nm1
pnm1=predict(nm1,45)
pnm1
```