```
### STAT 5814 HW2/PROBLEM 1
### AUTHOR: SAYANTAN MAJUMDAR
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### SNO: 12566087
library (TSA)
library(latex2exp)
par(mfrow=c(2, 2))
lag = 10
ACF = ARMAacf(ar=.6, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
\label{eq:main=TeX('$\mathbb{AR}(1)\, for\, \, \) = 0.6}$'))
abline(h=0)
ACF = ARMAacf(ar=-.6, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
main=TeX('$\mathbb{AR}(1)\,for\,\ \ = -0.6;))
abline(h=0)
ACF = ARMAacf(ar=.3, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
main=TeX('\$\mathbb{AR}(1)\,for\,\)
abline(h=0)
lag=20
ACF = ARMAacf(ar=.95, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
main=TeX('\$\mathbf{AR(1)\,for\, \phi = 0.95}$'))
abline(h=0)
                    AR(1) for \phi = 0.6
                                                            AR(1) for \phi = -0.6
        9.0
                                                0.2
        0.4
                                             ACF
                                                -0.2
        0.2
                                                9.0
               2
                     4
                           6
                                  8
                                        10
                                                      2
                                                                   6
                                                                          8
                                                                                10
                         Lag
                                                                 Lag
                    AR(1) for \phi = 0.3
                                                            AR(1) for \phi = 0.95
        0.30
                                                0.8
        0.20
                                                9.0
        0.10
                                                0.4
        00.0
                           6
                                  8
                                        10
                                                                 10
                                                                                20
                                                                        15
```

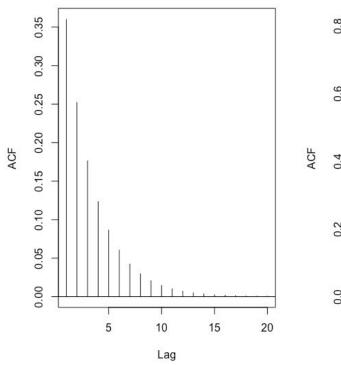
Lag

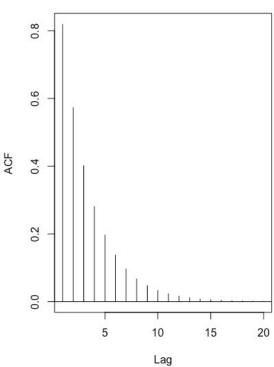
Lag

```
### STAT 5814 HW2/PROBLEM 3
### AUTHOR: SAYANTAN MAJUMDAR
### EMAIL: smxnv@mst.edu
### SNO: 12566087
library (TSA)
library(latex2exp)
par(mfrow=c(1, 2))
lag = 20
ACF=ARMAacf(ar=0.7, ma=-0.4, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
main=TeX('\$\mathbb{ARMA}(1, 1)\,for\, \phi = 0.7, \, \theta = 0.4\}\$'))
abline(h=0)
ACF=ARMAacf(ar=0.7, ma=0.4, lag.max=lag)
plot(y=ACF[-1], x=1:lag, xlab='Lag', ylab='ACF', type='h',
abline(h=0)
```



## ARMA(1,1) for $\phi = 0.7$ , $\theta = -0.4$

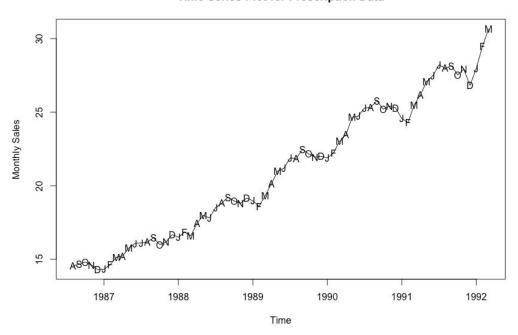




```
### STAT 5814 HW2/PROBLEM 6
### AUTHOR: SAYANTAN MAJUMDAR
### EMAIL: smxnv@mst.edu
### SNO: 12566087
library (TSA)
library(latex2exp)
par(mfrow=c(1, 1))
data(prescrip)
plot(prescrip, ylab='Monthly Sales', type='l', main='Time Series Plot for
Prescription Data')
points(y=prescrip,x=time(prescrip), pch=as.vector(season(prescrip)))
zlag prescrip = zlag(prescrip)
percentage=na.omit((prescrip - zlag prescrip) / zlag prescrip)
diff prescrip = diff(prescrip)
corr = round(cor(diff prescrip[-1], percentage[-1]), 3)
plot(x=diff\ prescrip[-1],\ y=percentage[-1],\ xlab=TeX('$\nabla{X t} = X t -
X \{t-1\} \setminus (First \setminus Differences)  '),
     ylab=TeX('$(X t - X {t-1}) / X {t-1}\), (Fractional\), Relaive\), Change)$'),
main=paste('Plot for First Differences, Correlation = ', corr))
qqnorm(diff prescrip[-1], main='QQ Plot for First Differences')
qqline(diff prescrip[-1])
shapiro.test(diff prescrip[-1])
```

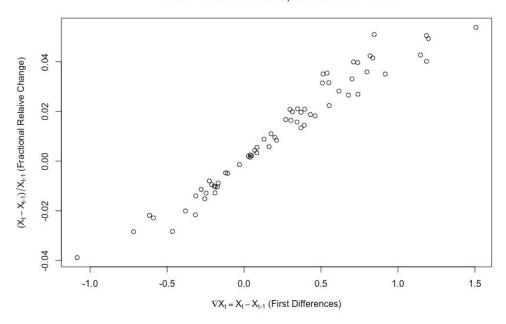
## Time Series Plot for Prescription Data

(a)



(b)

Plot for First Differences, Correlation = 0.973



(C)

## **QQ Plot for First Differences**

