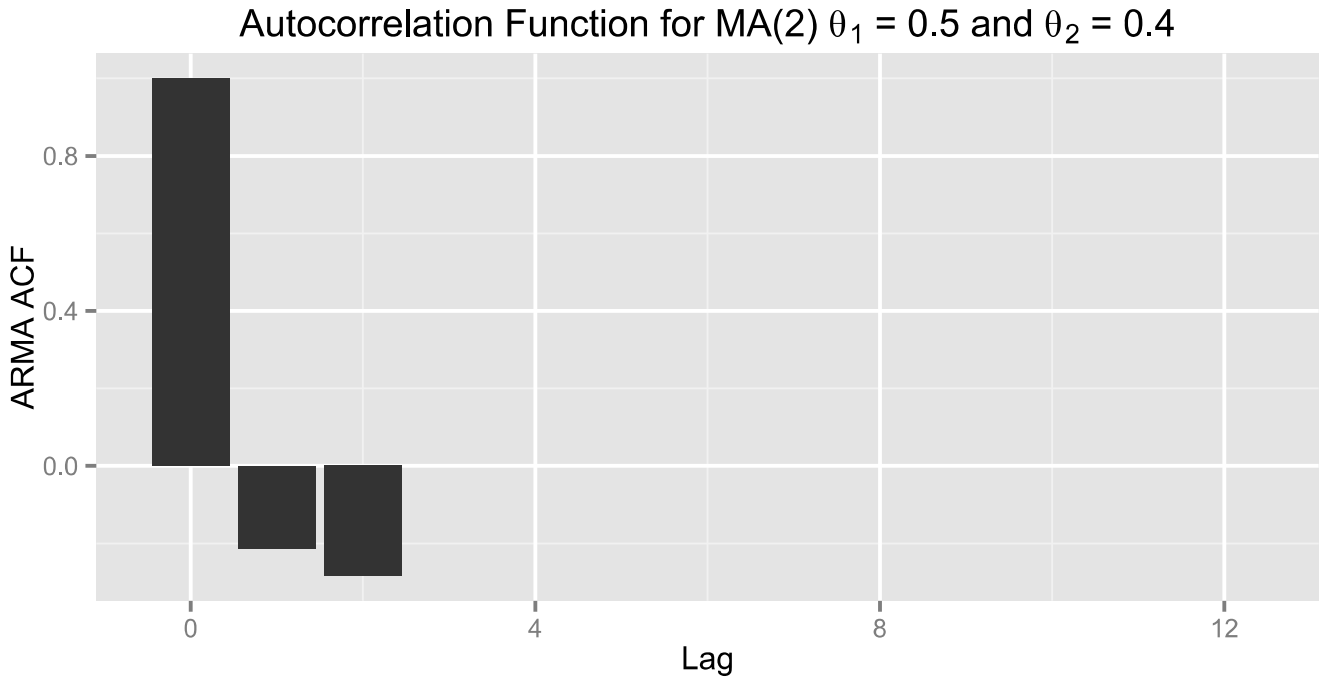
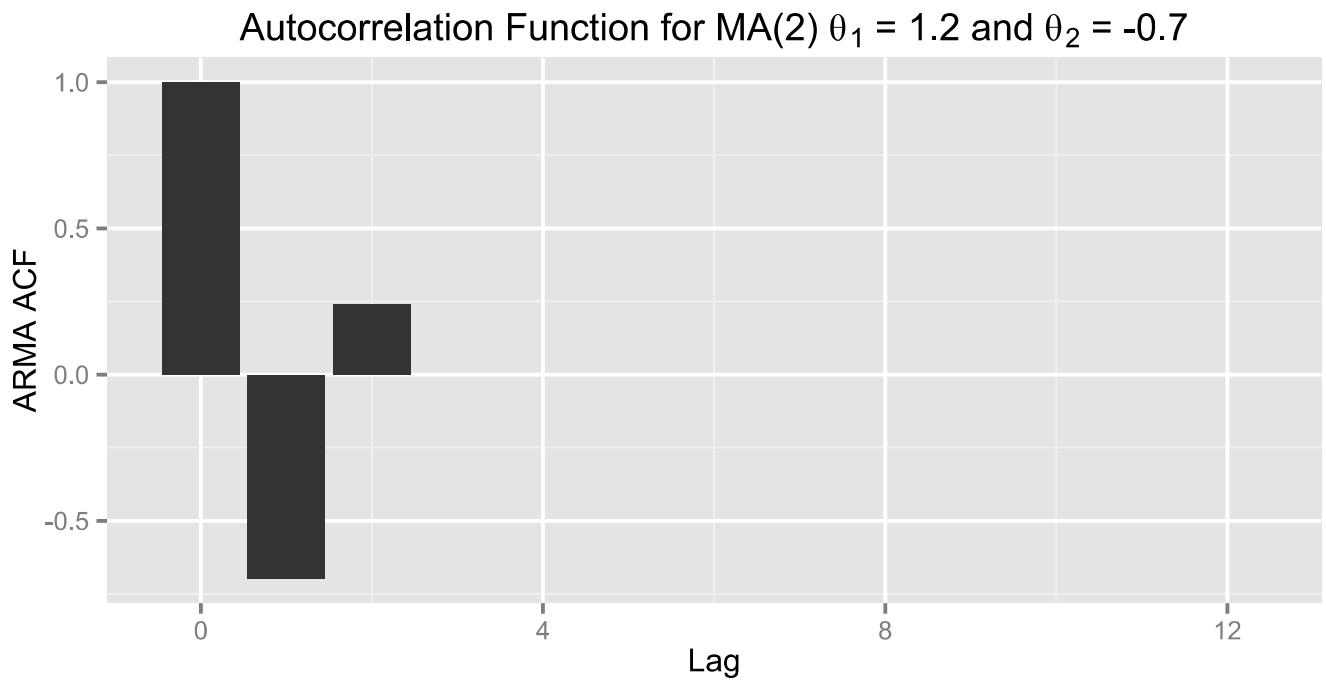
Time Series Analysis

4.2 Sketch the Autocorrelation Functions for the following MA(2) models

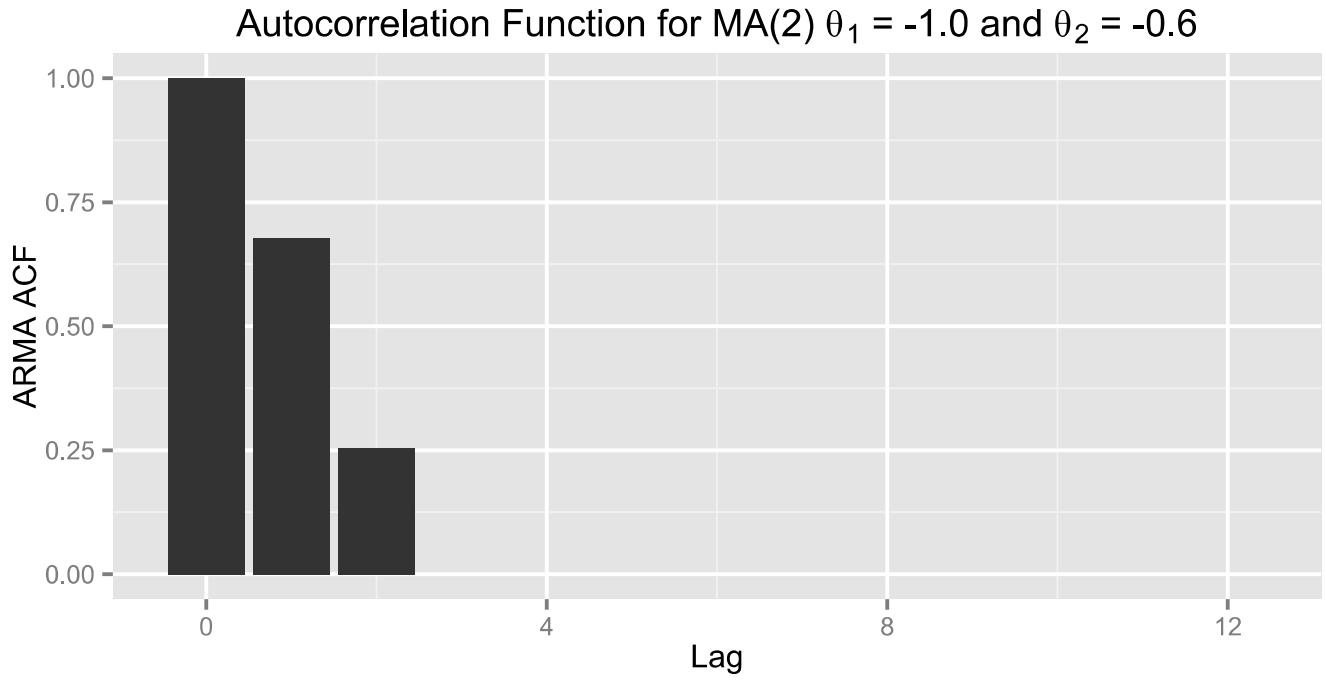
```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ma = c(-0.5,
-0.4), lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for MA(2) ",
    theta[1], " = 0.5 and ", theta[2], " = 0.4"))) +
xlab("Lag") + ylab("ARMA ACF")
```




```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ma = c(-1.2,
0.7), lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for MA(2) ",
    theta[1], " = 1.2 and ", theta[2], " = -0.7"))) +
xlab("Lag") + ylab("ARMA ACF")
```

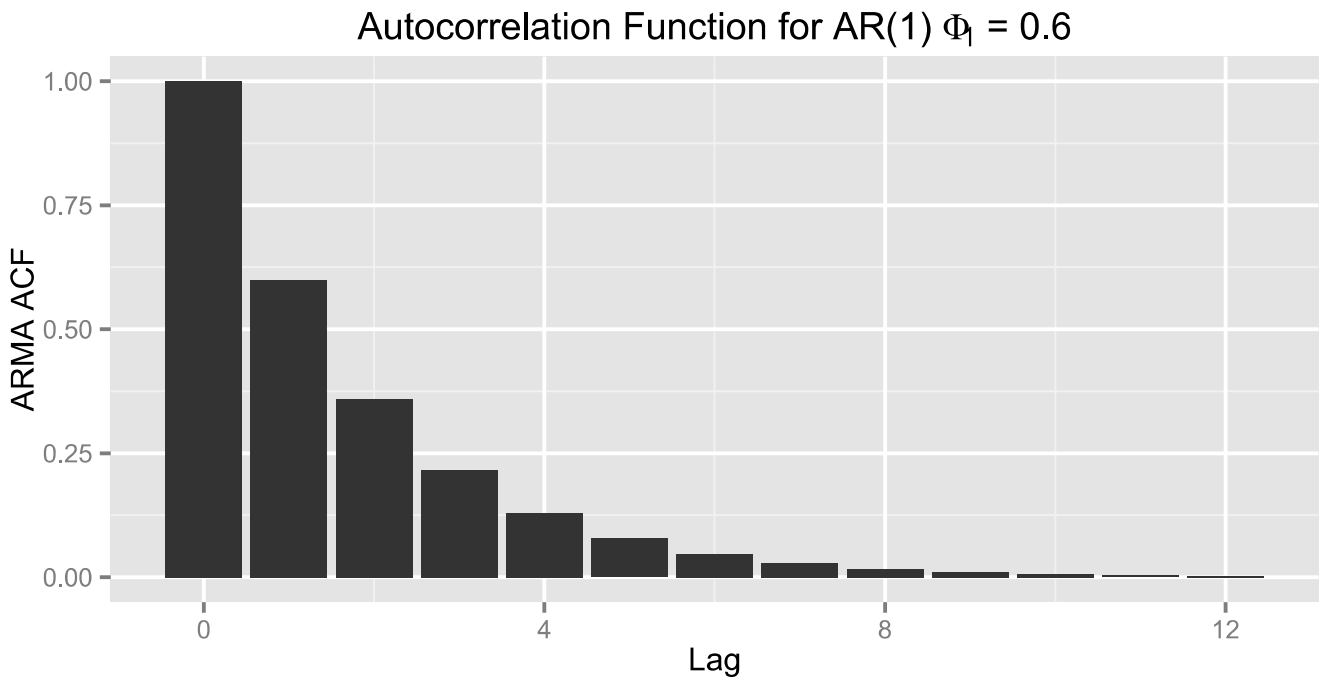



```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ma = c(1,
0.6), lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for MA(2) ",
    theta[1], " = -1.0 and ", theta[2], " = -0.6"))) +
xlab("Lag") + ylab("ARMA ACF")
```

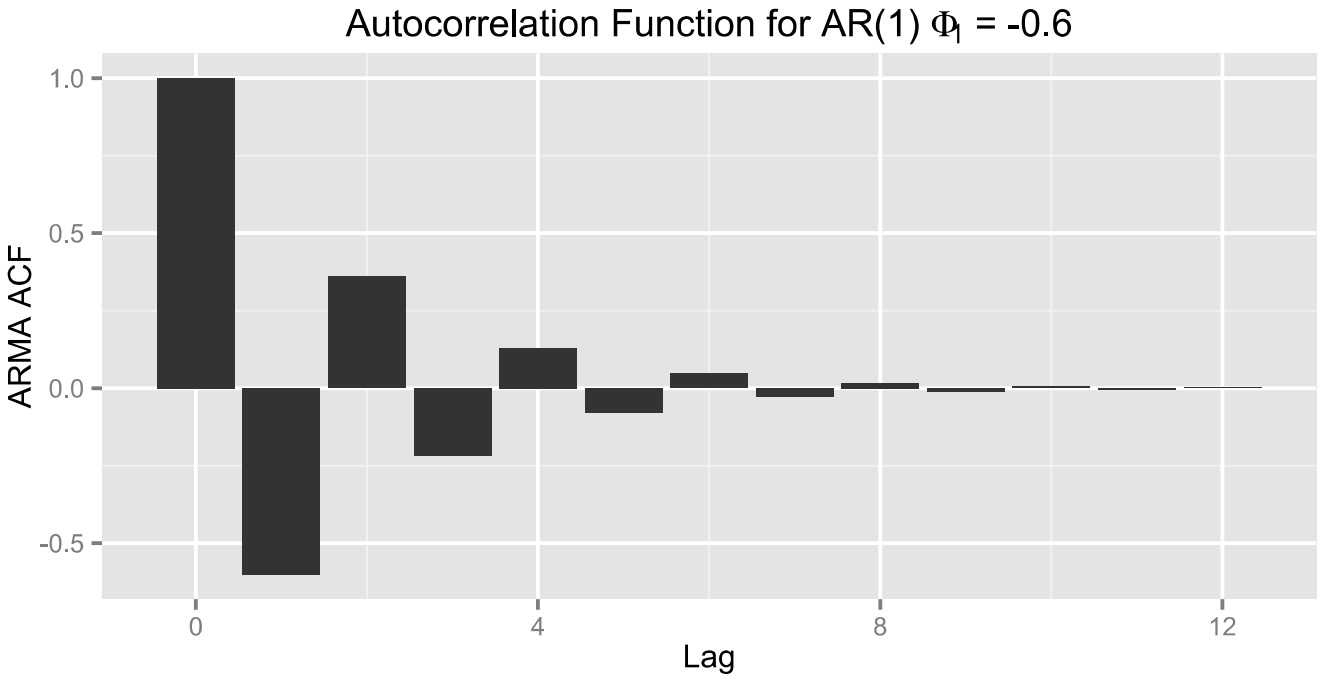


4.5 Calculate and sketch the autocorrelation functions for the following AR(1) models

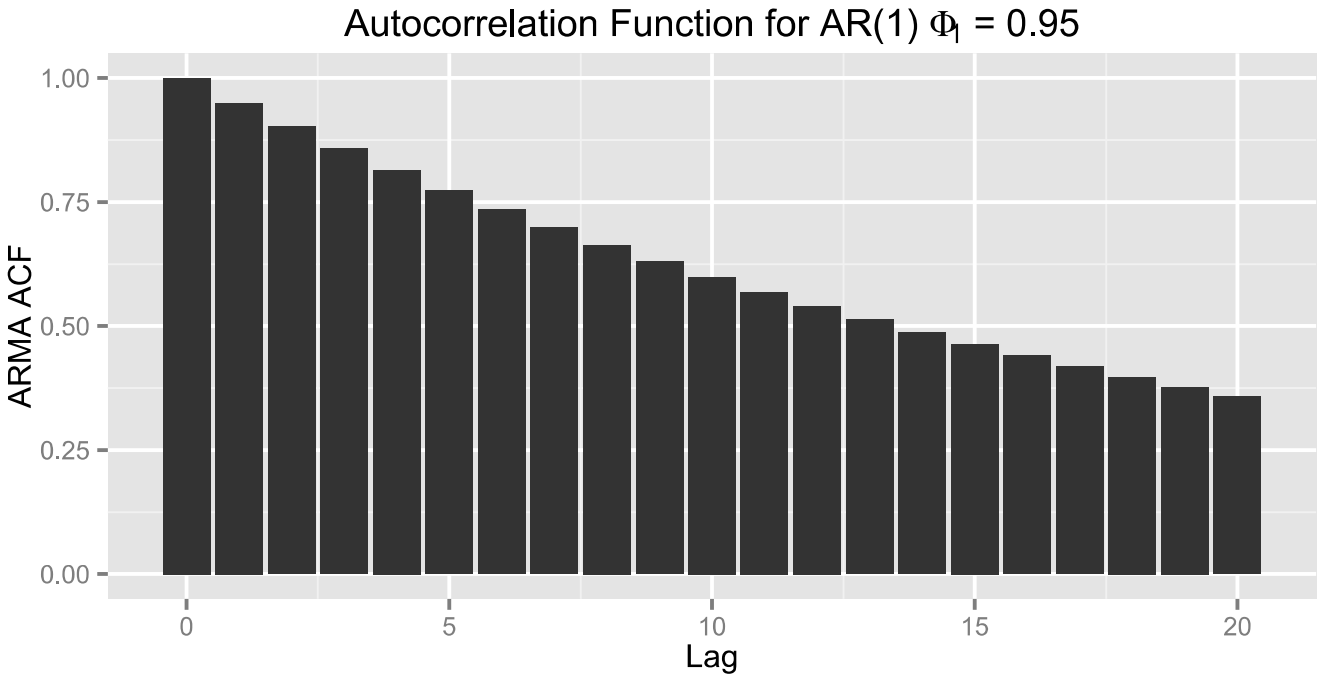
```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ar = 0.6,
lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for AR(1) ",
    Phi[1], " = 0.6"))) + xlab("Lag") + ylab("ARMA ACF")
```



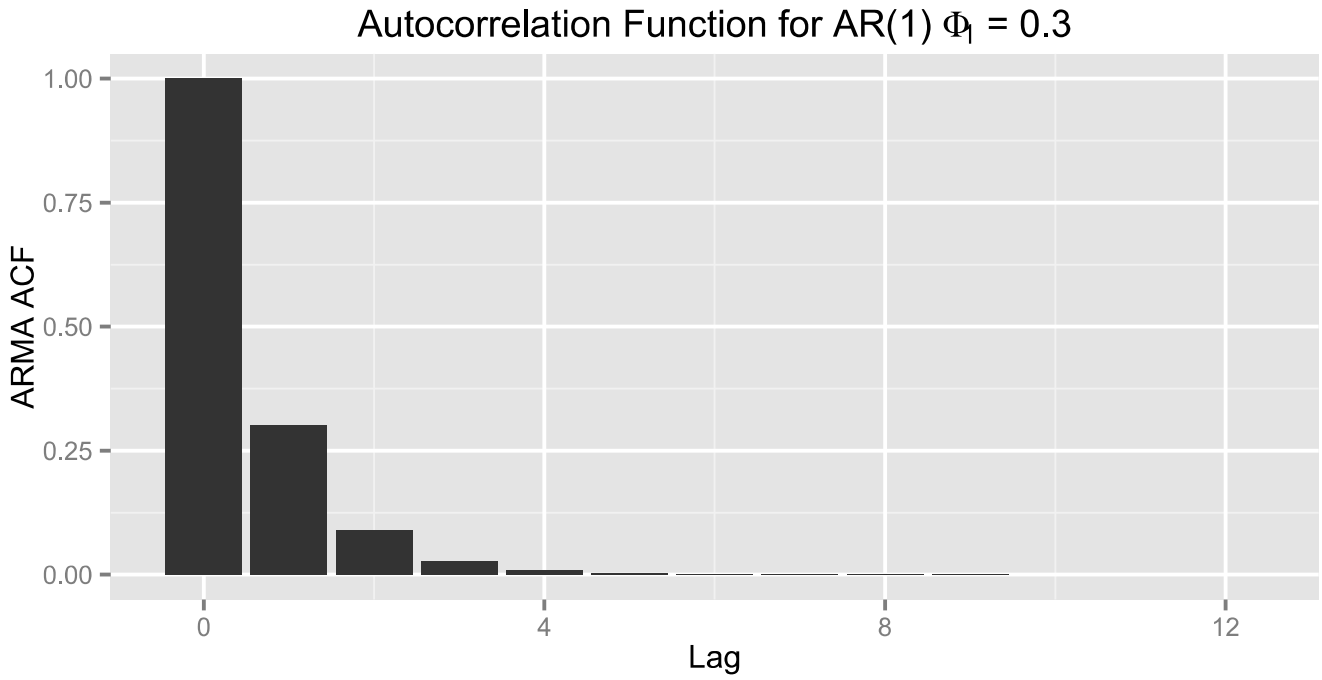

```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ar = -0.6,
lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for AR(1) ",
    Phi[1], " = -0.6"))) + xlab("Lag") + ylab("ARMA ACF")
```




```
df <- data.frame(lag = 0:20, ARMAacf = ARMAacf(ar = 0.95,
lag.max = 20))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for AR(1) ",
    Phi[1], " = 0.95"))) + xlab("Lag") + ylab("ARMA ACF")
```

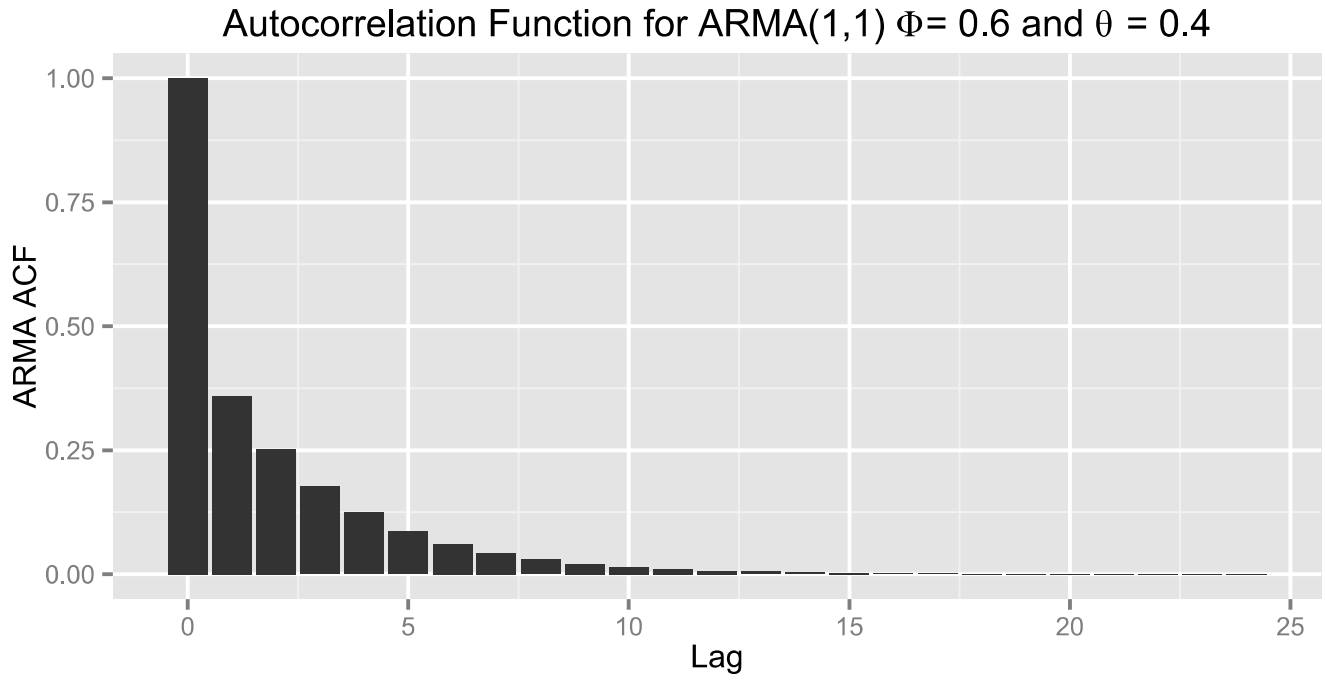


```
df <- data.frame(lag = 0:12, ARMAacf = ARMAacf(ar = 0.3,
lag.max = 12))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for AR(1) ",
    Phi[1], " = 0.3"))) + xlab("Lag") + ylab("ARMA ACF")
```



4.10 Sketch the ACF for the following functions

```
df <- data.frame(lag = 0:24, ARMAacf = ARMAacf(ar = 0.7, ma
= -0.4, lag.max = 24))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for ARMA(1,1) ",
    Phi, " = 0.6 and ", theta, " = 0.4"))) + xlab("Lag") +
ylab("ARMA ACF")
```




```
df <- data.frame(lag = 0:24, ARMAacf = ARMAacf(ar = 0.7, ma
= 0.4, lag.max = 24))
ggplot(df, aes(x = lag, y = ARMAacf)) + geom_bar(stat =
"identity") + ggtitle(expression(paste("Autocorrelation
Function for ARMA(1,1) ",
    Phi, " = 0.6 and ", theta, " = 0.4"))) + xlab("Lag") +
ylab("ARMA ACF")
```