# Quiz1_Problem4

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## Load Packages

```
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
## Version 0.4-0 included new data defaults. See ?getSymbols.
```

```
library(forecast)
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------------------------------------
```

```
## v ggplot2 3.3.0     v purrr   0.3.3
## v tibble  2.1.3     v dplyr   0.8.5
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0
```

```
## -- Conflicts ------------------------------------------------------------------------------------
## x dplyr::filter() masks stats::filter()
## x dplyr::first()  masks xts::first()
## x dplyr::lag()    masks stats::lag()
## x dplyr::last()   masks xts::last()
```

## Part A

```
getSymbols("TSLA", src = "yahoo", from = "2014-01-01")
```

```
## 'getSymbols' currently uses auto.assign=TRUE by default, but will
## use auto.assign=FALSE in 0.5-0. You will still be able to use
```

```
## 'loadSymbols' to automatically load data. getOption("getSymbols.env")
## and getOption("getSymbols.auto.assign") will still be checked for
## alternate defaults.
##
## This message is shown once per session and may be disabled by setting
## options("getSymbols.warning4.0"=FALSE). See ?getSymbols for details.
```

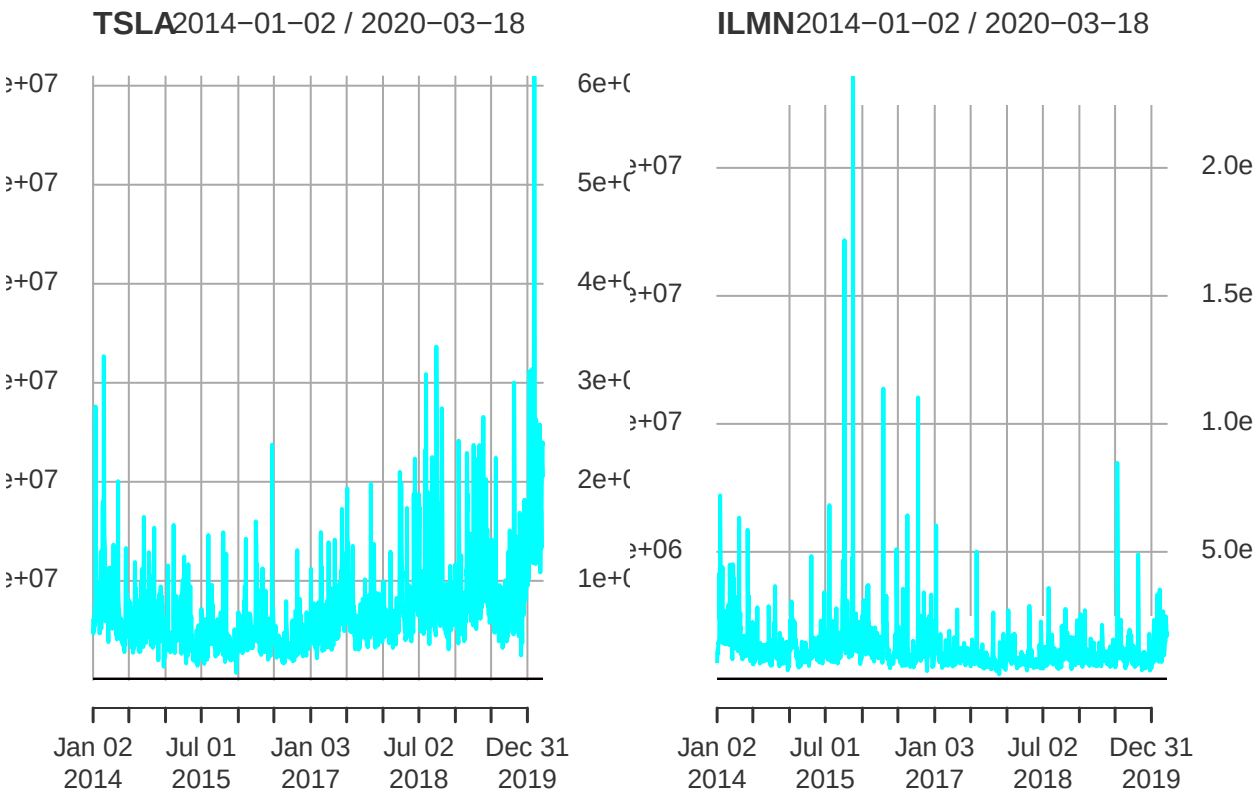
```
## [1] "TSLA"
```

```
getSymbols("ILMN", src = "yahoo", from = "2014-01-01")
```

```
## [1] "ILMN"
```

## Part B

```
par(mfrow = c(1, 2))
plot(TSLA)
plot(ILMN)
```




## Part C

```
getArimaModel <- function(ts_var) {
  xts_object <- auto.arima(ts_var)
  p <- length(xts_object$model$phi)
```

```
  d <- length(xts_object$model$Delta)
  q <- length(xts_object$model$theta)

  return(paste(p, d, q, sep = "-"))
}

ilmnSplit <- split(ILMN[, 4], f = "months", k = 4) #Uses only closing values
ilmnModels <- lapply(ilmnSplit, getArimaModel)
table(unlist(ilmnModels))
```

```
##
## 0-1-0 0-2-1 1-0-0
##    16     1     1
```

```
tslaSplit <- split(TSLA[, 4], f = "months", k = 4) #Uses only closing values
tslaModels <- lapply(tslaSplit, getArimaModel)
table(unlist(tslaModels))
```

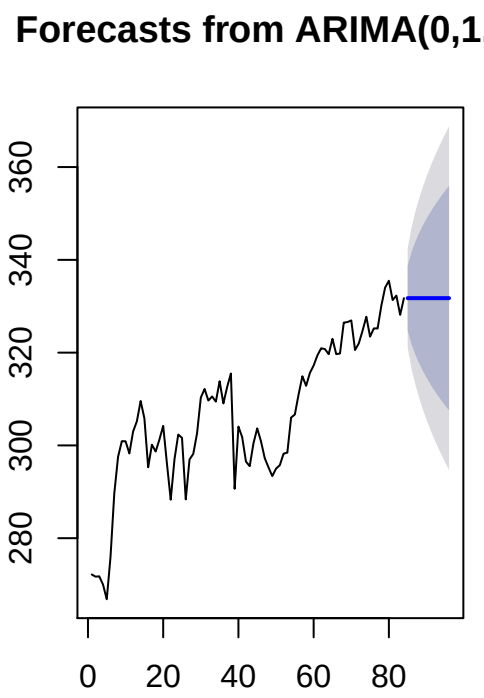
```
##
## 0-1-0 1-0-0 1-1-0
##    16     1     1
```

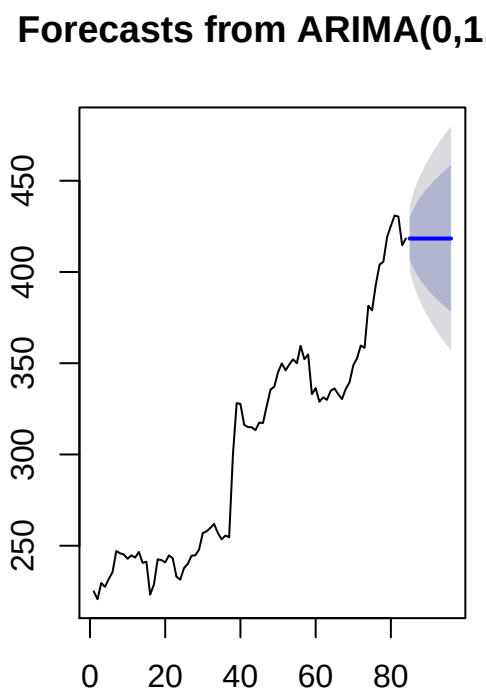
## Part D

```
par(mfrow = c(1, 2))

# ILMN
ILMN <- ilmnSplit[[length(ilmnSplit)]]
arima(ILMN, order = c(0, 1, 0)) %>% forecast(h = 12) %>% plot

# TSLA
TSLA <- tslaSplit[[length(tslaSplit)]]
arima(TSLA, order = c(0, 1, 0)) %>% forecast(h = 12) %>% plot
```


Forecasts from ARIMA(0,1,0)
280
300
320
340
360
0
20
40
60
80


Forecasts from ARIMA(0,1,0)
250
300
350
400
450
0
20
40
60
80