Homework 4

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```
#install.packages(‘rjson’, repos=‘http://cran.us.r-project.org’)
library(‘rjson’)
json_file = ‘http://crix.hu-berlin.de/data/crix.json’
json_data = fromJSON(file=json_file)
crix_data_frame = as.data.frame(json_data)
n<-dim(crix_data_frame)
a<-seq(1,n[2],2)
b<-seq(2,n[2],2)
date<-t(crix_data_frame[1,a])
price<-t(crix_data_frame[1,b])
```

```
ts.plot(price)
ret<-diff(log(price))
plot(ret)
ts.plot(ret)

# histogram of returns
hist(ret, col = ‘black’, breaks = 20, freq = FALSE, ylim = c(0, 25), xlab = NA)
lines(density(ret), lwd = 2)
mu = mean(ret)
sigma = sd(ret)
x = seq(-4, 4, length = 100)
curve(dnorm(x, mean = mean(ret), sd = sd(ret)), add = TRUE, col = ‘blue’, lwd = 2)
```

```
# qq-plot
qqnorm(ret)
qqline(ret, col = ‘grey’, lwd = 3)

# acf plot
autocorr = acf(ret, lag.max = 20, ylab = ‘Sample Autocorrelation’, main = NA,lwd = 2,
ylim = c(-0.3, 1))

# plot of pacf
autopcorr = pacf(ret, lag.max = 20, ylab = ‘Sample Partial Autocorrelation’, main = NA,
ylim = c(-0.3, 0.3), lwd = 2)
```

```
# select p and q order of arima model
fit4 = arima(ret, order = c(2, 0, 3))
tsdiag(fit4)
Box.test(fit4$residuals, lag = 1)

fitr4 = arima(ret, order = c(2, 1, 3))
tsdiag(fitr4)
Box.test(fitr4$residuals, lag = 1)

# to conclude, 202 is better than 213
fit202 = arima(ret, order = c(2, 0, 2))
tsdiag(fit202)
tsdiag(fit4)
tsdiag(fitr4)
```

```
# arima202 predict

fit202 = arima(ret, order = c(2, 0, 2))
crpre = predict(fit202, n.ahead = 30)
dates = seq(as.Date('02/08/2014', format = '%d/%m/%Y'), by = 'days', length =
length(ret))
plot(ret, type = 'l', xlim = c(0, 644), ylab = 'log return', xlab = 'days',lwd = 1.5)
lines(crpre$pred, col = 'green', lwd = 3)
lines(crpre$pred + 2 * crpre$se, col = 'green', lty = 3, lwd = 3)
lines(crpre$pred - 2 * crpre$se, col = 'green', lty = 3, lwd = 3)
```