36-402 Homework 1

Eu Jing Chua
eujingc

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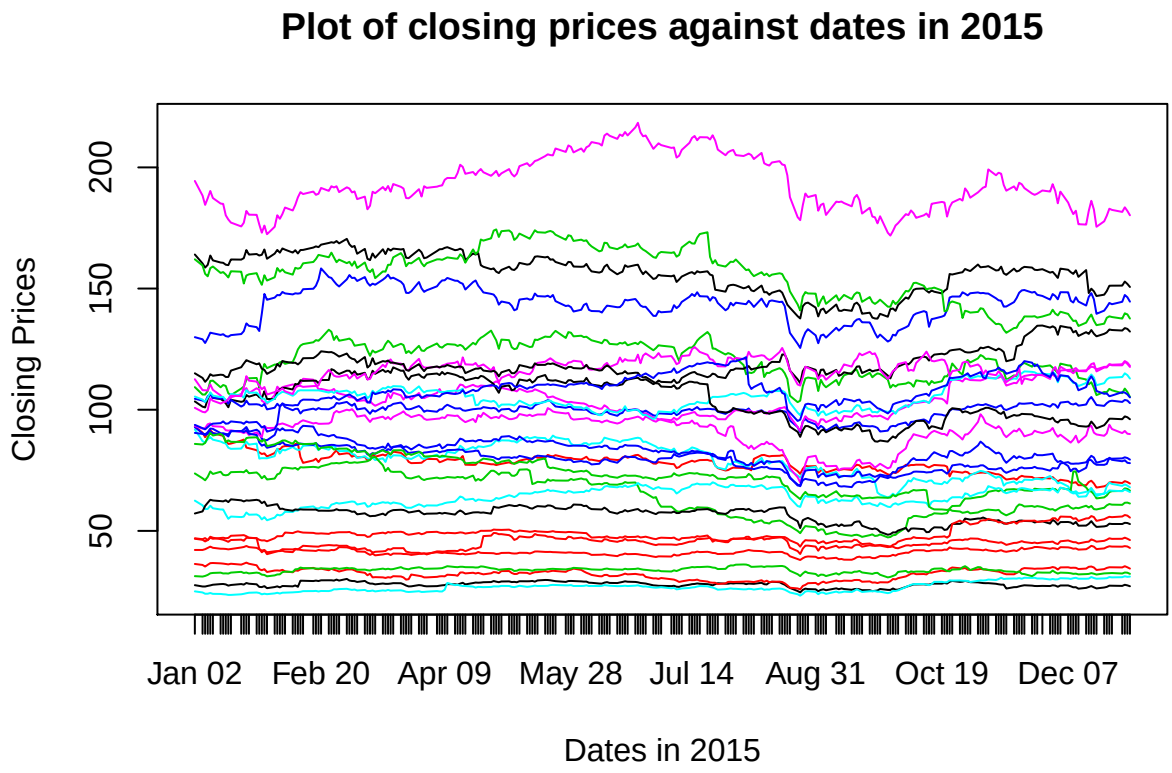
Question 1

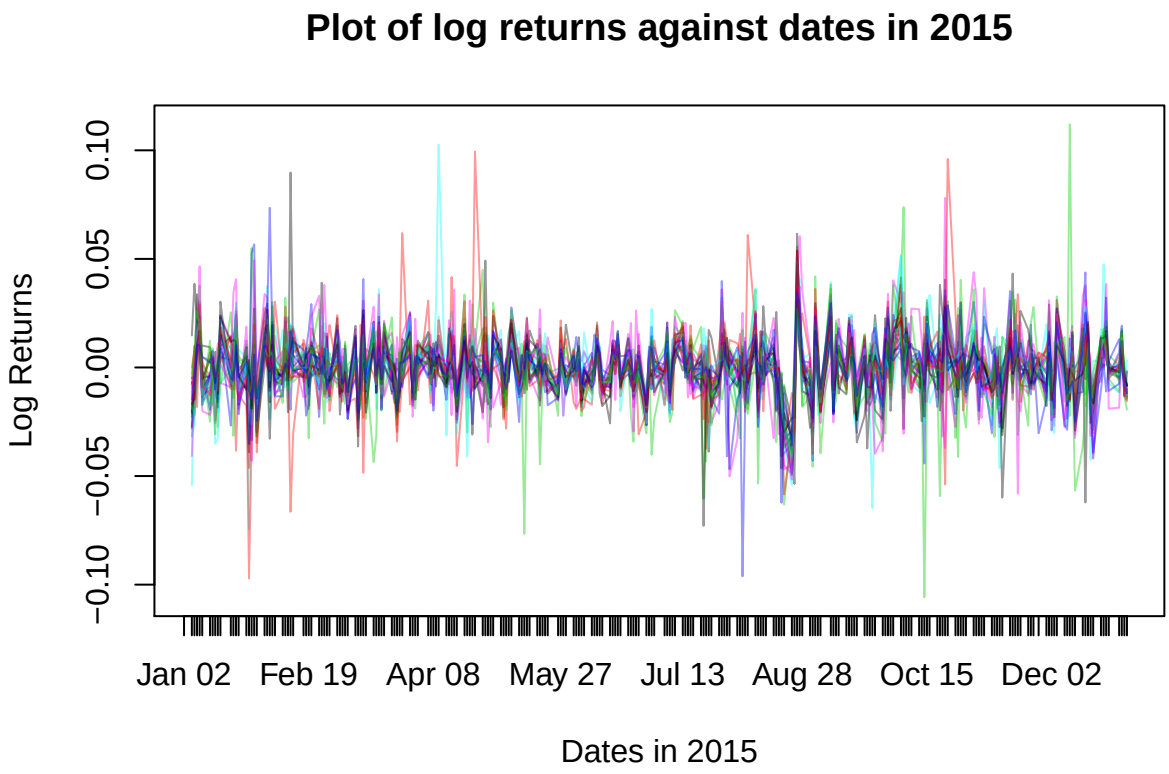
a)



b)

```
n <- nrow(close_price)
l.returns <- log(close_price[2:n, ] / close_price[1:(n-1), ])
```

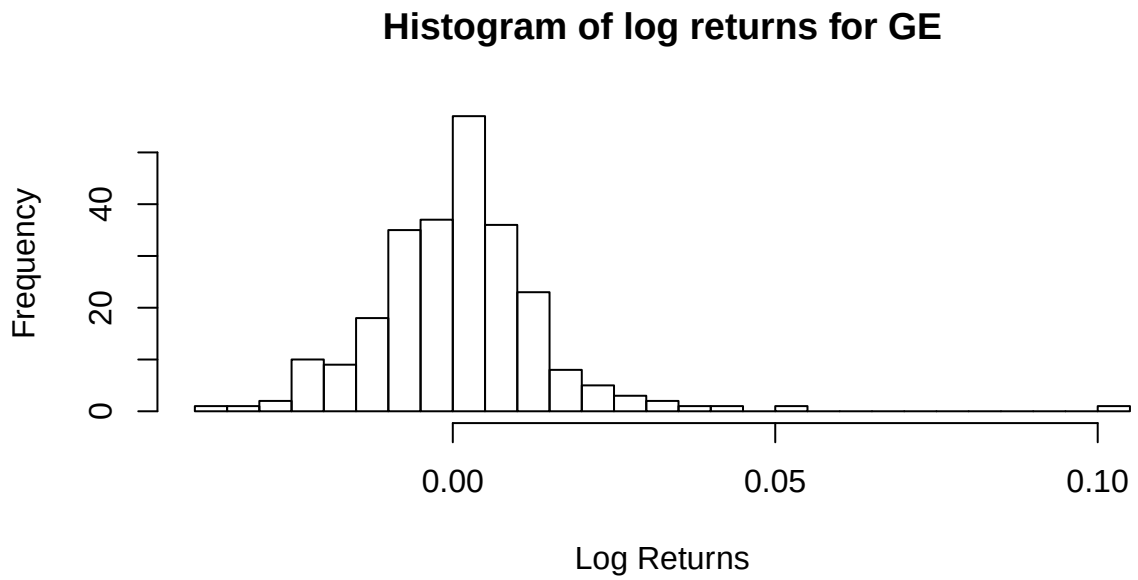
c)



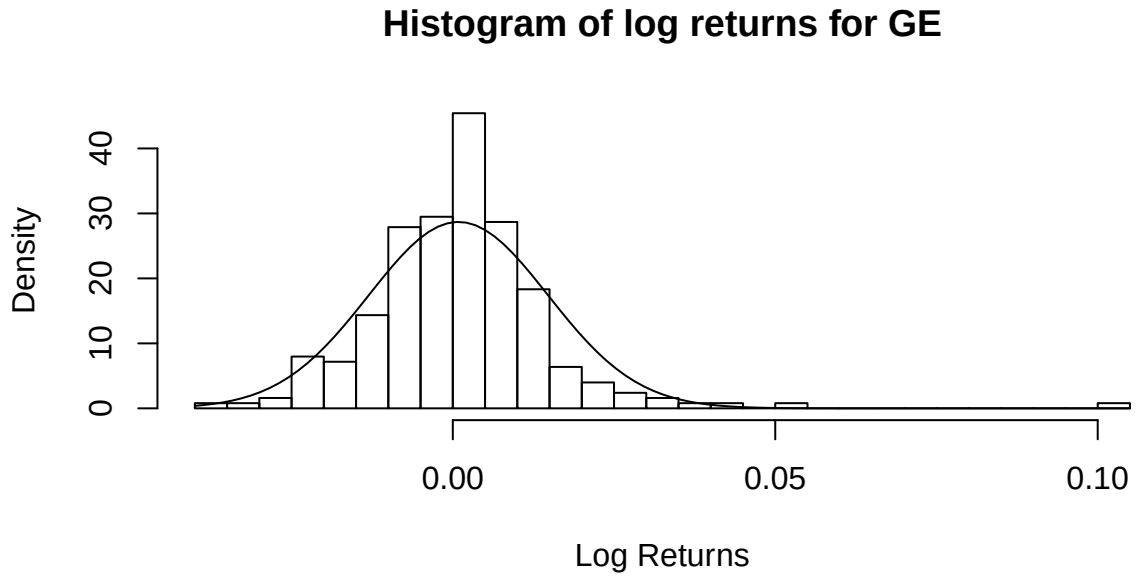
The log returns look more comparable as they all have the same scale now and the dependence over time is more visible.

Question 2

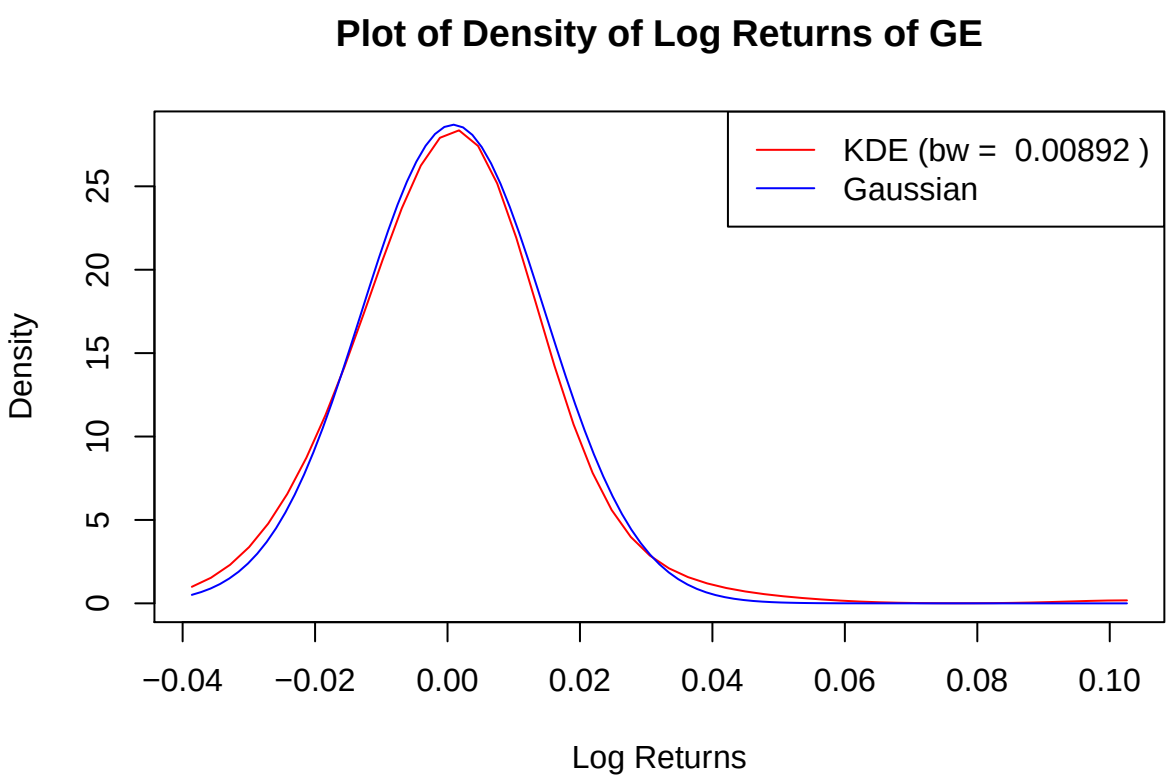
a)



b)



The normal distribution appears to fit the distribution of the log returns well, with the exception of possible outliers with exceptionally high log returns. **c)**



The kernel density estimate (KDE) has heavier tails than the best-fitting gaussian and is also slightly skewed to the left. The KDE also has relatively lower density around the mean.