Stats_c183_HW5_Charles_Liu

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Load Necessary Packages:

```
library(readr)
```

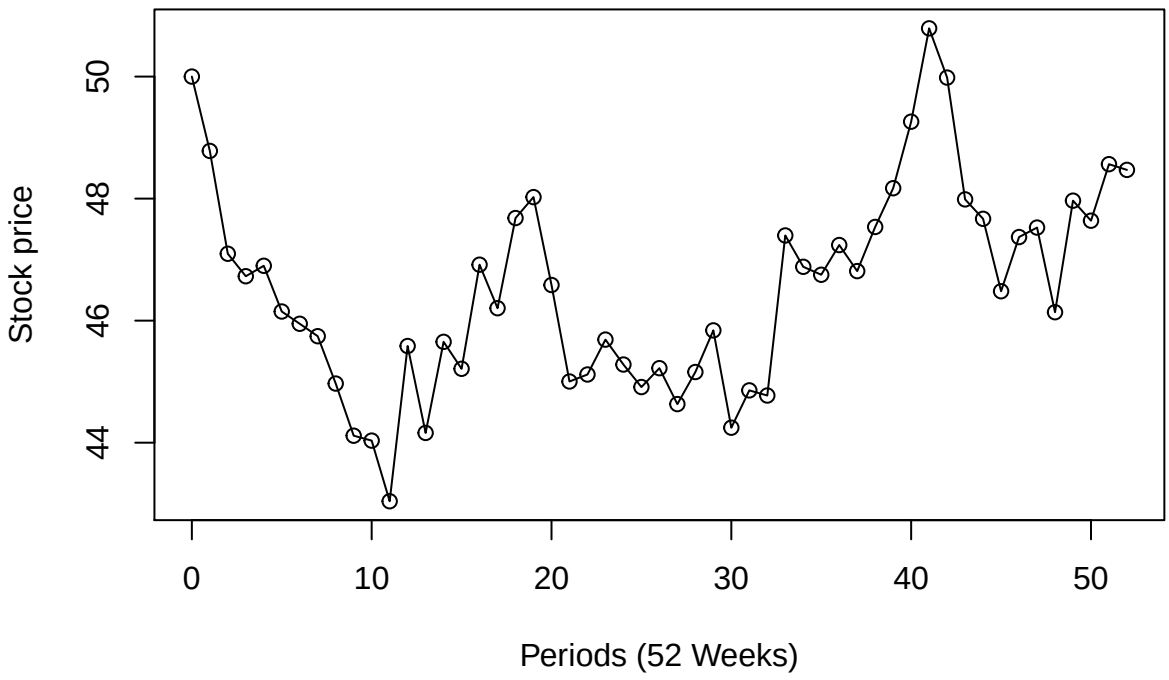
1b)

```
epsilon <- c(0,rnorm(52))
S <- c(50,rep(0,52)) # S_0 = $50 & 52 weeks
DS <- rep(0,53)

for(i in(1:52)) {
  DS[i+1] <- 0.0020*S[i] + 0.025*S[i]*epsilon[i+1]
  S[i+1] = S[i] + DS[i+1]
}

x <- seq(0,52)
xx <- as.data.frame(cbind(x, epsilon, DS, S))

# Plot using 52 weeks
plot(x, S, type="l", xlab="Periods (52 Weeks)", ylab="Stock price")
points(x,S)
```



6)

```
a <- read.csv("C:/Users/cliuk/Documents/UCLA Works/UCLA Spring 2020/Stats C183/Homeworks/HW 5/AAPL.csv"

# Calculate it by hand
n <- nrow(a)
p <- a[,3]
temp <- p/p[-1]
u <- log(temp)
b <- 1/(n-1)
c <- sum(u^2)
d <- sum(u)
s <-(b*(c - (d^2/n)))
trade_days <- 365 - n
sigma_hat <- sqrt(trade_days) * s

# Value of annual volatility estimation:
sigma_hat
```

```
## [1] 0.03173322
```

```
# Therefore the annual volatility is sigma = 3/rate(%)
```