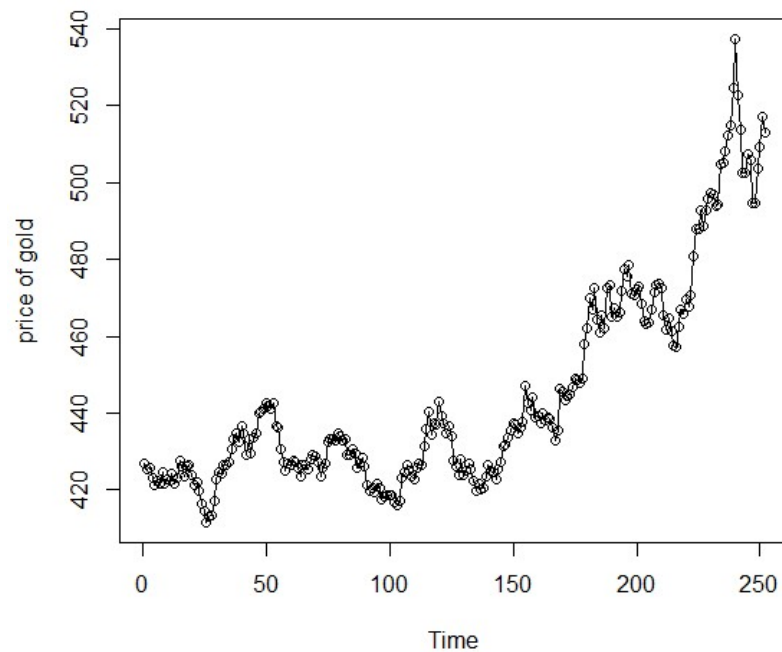


```
# Title: STAT 485 Assignment 2
# Author: Injun Son
# Date: October 4, 2020

#Q1. The dataset gold gives a time series of the daily price of gold (in $ per troy ounce) for the 252 trading days of the year 2005.
#(a) Read in this dataset using the function data() in the TSA package.
library(TSA)
data(gold)

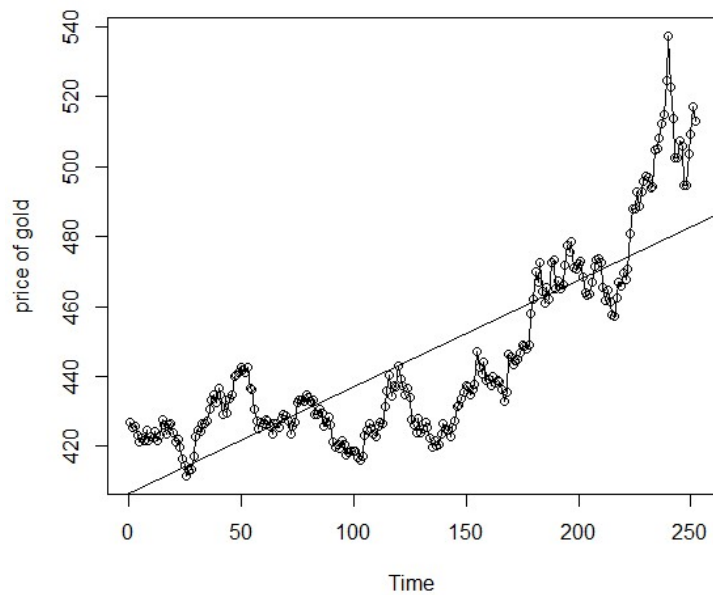
#(b) Plot the dataset. Remember to label the x- and y-axes. Briefly describe what you see.
plot(gold, ylab="price of gold", xlab="Time", type="o")
```



The graph shows that the price of daily gold has been raised, even though it has oscillated

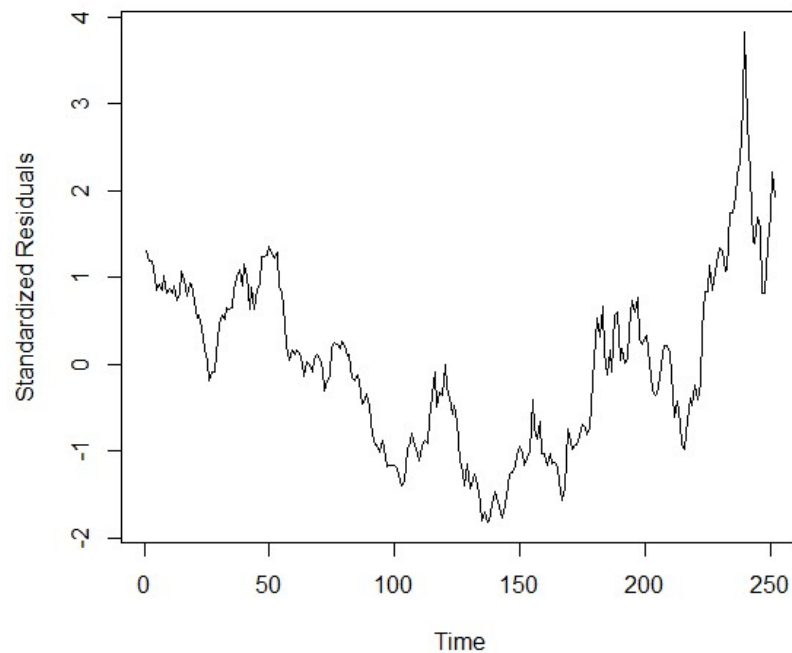
```
#(c) Fit a linear time trend to this dataset. what are the estimates of the intercept and the slope?
model = lm(gold ~ time(gold))
summary(model)
#Intercept: 406.3537 slope: 0.3054

#(d) Add the fitted line to the plot using the function abline(). Show the plot.
win.graph(width = 4.875, height=2.5, pointsize=8)
plot(gold, type="o", ylab="price of gold", xlab = "Time")
abline(model)
```



```
#(e) Using the estimates of the intercept and the slope, calculate the estimated mean price of gold at day 100.
#  $y = 0.3054x + 406.3537$  ( $x=100$ )
#  $30.54 + 406.3537 = 436.8937$ 

# (f) Plot the (studentized) residuals of the model against time. Describe what you see in the plot.
plot(y=rstudent(model), x=as.vector(time(gold)), xlab = "Time", ylab="Standardized Residuals", type="l")
# The graph looks like it's not independent because each value is quite close.
```



```
#(g) The residual plot is telling us that the linear fit may not be appropriate. To fit a quadratic model, use the code
#my.model <- lm(gold ~ time(gold) + I(time(gold)^2))
#Note: The I() part of the code is necessary, because otherwise the ^ symbol will not do what we want it to.)
#what are the three parameter estimates?

quadratic_model = lm(gold ~ time(gold) + I(time(gold)^2))
summary(quadratic_model)

#Intercept : 4.346e+02 time(gold): -3.618e-01 I(time(gold)^2): 2.637e-03

#(h) Plot the (studentized) residuals of the quadratic model against time. what do you see now?
plot(y=rstudent(quadratic_model), x=as.vector(time(gold)), xlab = "Time", ylab="Standardized Residuals", type="l")
#Now it looks like the pattern does not exist
```

