HW1

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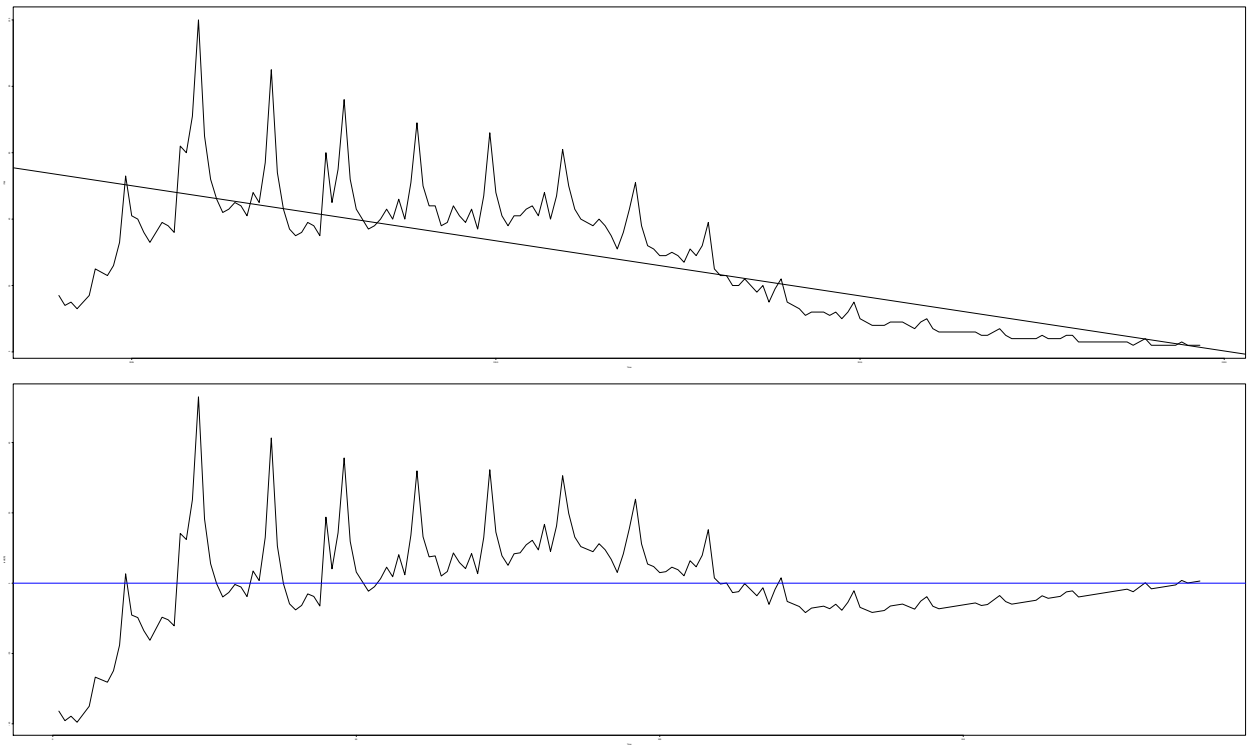
Computer Practice

```
dataset = read.csv("/Users/li/Desktop/STAT153/iPod.csv")
iPod = ts(dataset$iPod,start =c(2004,1),frequency = 12)
```

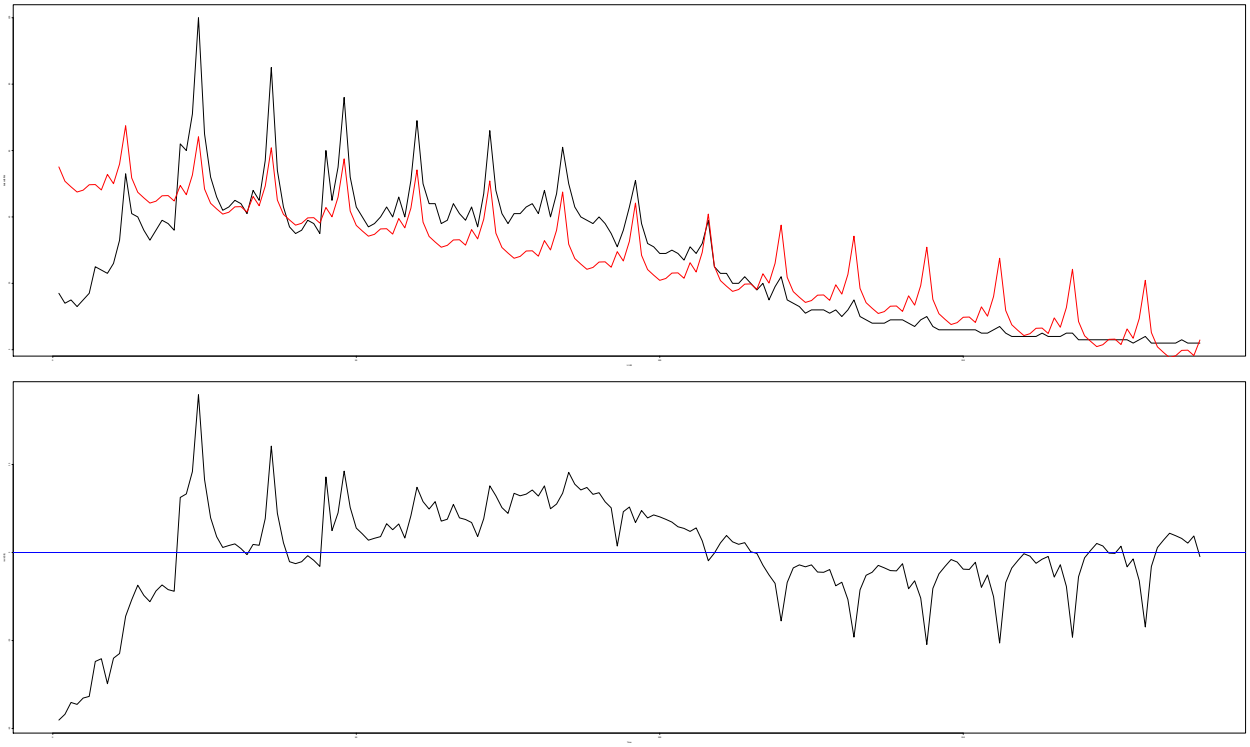
Part 1

```
##
## Call:
## lm(formula = iPod ~ time(iPod))
##
## Coefficients:
## (Intercept)   time(iPod)
##    6704.145       -3.319
```



The trend is downward, showing that iPod salesvolume is decreasing every year. The residuals has cylicity, showing that there may be a seasonality in time series.

Part 2



The trend is downward with cylicity of 12 month, showing that iPod salesvolume is decreasing every year, and have a peak every year. The residuals is not white noise, showing that there may be other factors in regression.

Part 3

The second is trustworthy because it show there is a peak season of iPad, which is in line with reality. (sorry I can't find way to show predicted fitted line.But Both two model doesn't fit well when t =190-204) The reason may be the ipod has become an obsolete product line since 2019. So no more new ipod comes out and the peak doesn't exist.

Questions

1. $P\{|r_k| >= 1.96/sqrt(n)\}$=5%

the number is 5%N

2.$P\{|r_k| >= 1.96 \times 1.2/sqrt(n)\} = 2 * (1 - 0.9906) = 0.0188$

3. $P_0 = P\{noneofr_kisoutside\} = 95\%^{100}$ $P_1 = P\{oneofr_kisoutside\} = 100 * 5\% * 95\%^{99}$ $P_2 = P\{twoofr_kisoutside\} = 100 * 99/2 * 5\%^2 * 95\%^{98}$ $P_3 = P\{threeofr_kisoutside\} = 100 * 99 * 98/6 * 5\%^3 * 95\%^{97}$ $P = 1 - P_0 - P_1 - P_2 - P_3 = 0.74$

4.

(a)

$Cov(X_r, Y_s) = 0$

$E(X_t + Y_t) = E(X_t) + E(Y_t) = E(X) + E(Y) = const$

$Cov(X_t+Y_t, X_s+Y_s) = Cov(X_t, X_s)+Cov(X_t, Y_s)+Cov(Y_t, X_s)+Cov(Y_t, Y_s) = Cov(X_t, X_s)+Cov(Y_t, Y_s)$ only depend on t-s

so $X_t + Y_t$ is weak-stationary

(b)

i) Yes, see prove below.

ii) No, for t even and t odd, distribution is not identical.

iii) Yes.because X is white noise, X is weak stationary

iv) No. When h = 1, X_t is not identically distribute,