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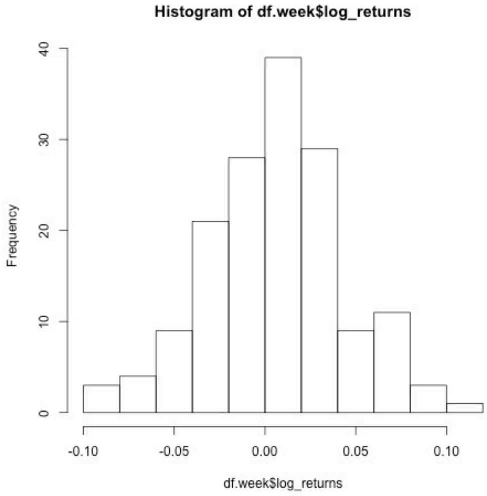
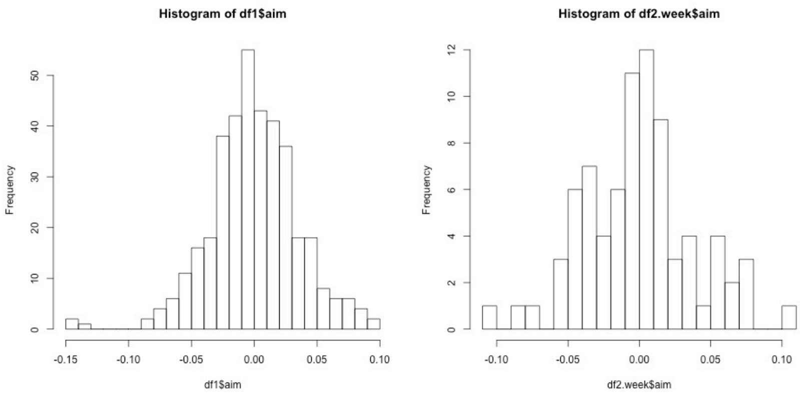
1.

a) Produce a histogram of the active-trading weekly returns for NVDA, from 1st January 2015 to 1st January 2018.




b)




We would expect these two graphs to have similar curve. The first half and second half should both be close to normal curve.

$X_i$ : ith day log-return , $\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$ : average daily log return ,

$Y_n = \sum_{i=1}^{5} X_{ni}$ : weekly sum of daily log-returns at nth week , $\bar{Y} = \frac{5}{n}\sum_{i=1}^{n/5} Y_i$ : average weekly log-return.

$E(X)=\mu$, $Var(X)=\sigma^2$, $E(\bar{X})=\mu$, $Var(\bar{X})=\frac{\sigma^2}{n}$

$E(Y)=5\mu$, $Var(Y)=5\,Var(X)=5\sigma^2$, $E(\bar{Y})=5E(X)=5\mu$, $Var(\bar{Y})=\frac{25\sigma^2}{n}$

$A=\sqrt{5}(X_t-\bar{X})$ $\quad B=Y-\bar{Y}$

A: $E(A)=0$, $Var(A)=Var(\sqrt{5}(X_t-\bar{X}))=5E(((X_t-\bar{X})-E(X_t-\bar{X}))^2)=5E((X_t-E(X_t))^2)=5Var(X)=5\sigma^2$

( ∵ sample mean = population mean when data size is large, ∴ $E(X)=\bar{X}=E(\bar{X})$ )

B: $E(B)=0$, $Var(B)=E((Y-E(Y))^2)=Var(Y)=5\sigma^2$ ( Same reason as A )

∵ $E(A)=E(B)$, $var(A)=var(B)$ , ∴ The two histograms are similar.

c)

For the unknown mean, we use t distribution and obtain approximate 95% confidence interval [0.00109843674582069, 0.00114803633495787].

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[1] "The 95% CI for mean is (0.00109843674582069, 0.00114803633495787)."
> # "The 95% CI is (0.00109843674582069, 0.00114803633495787)."
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For the unknown variance, we use chi-squared distribution and obtain approximate 95% confidence interval [0.000314579436720997, 0.000385004400782479].

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[1] "The 95% CI for vairance is (0.000314579436720997, 0.000385004400782479)."
> # "The 95% CI for vairance is (0.000314579436720997, 0.000385004400782479)."
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2. Display histograms for your data set by stock symbol AAPL in a Shiny web app.