HW 1

1.Pick 5 stocks from US market and write a Python code to load historical between 2009-2019 data from Yahoo Finance. Each of students must not choose the same set of stocks.

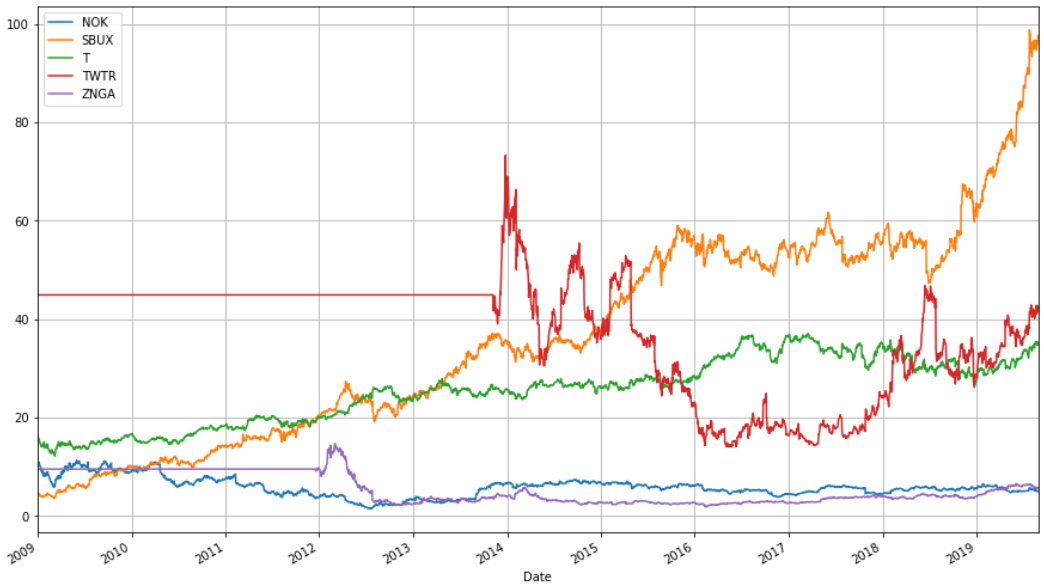
Ans. NOK T TWTR ZNGA SBUX

2. Plot historical prices, simple daily returns, and log daily returns of 5 stocks, and describe what you have observed.

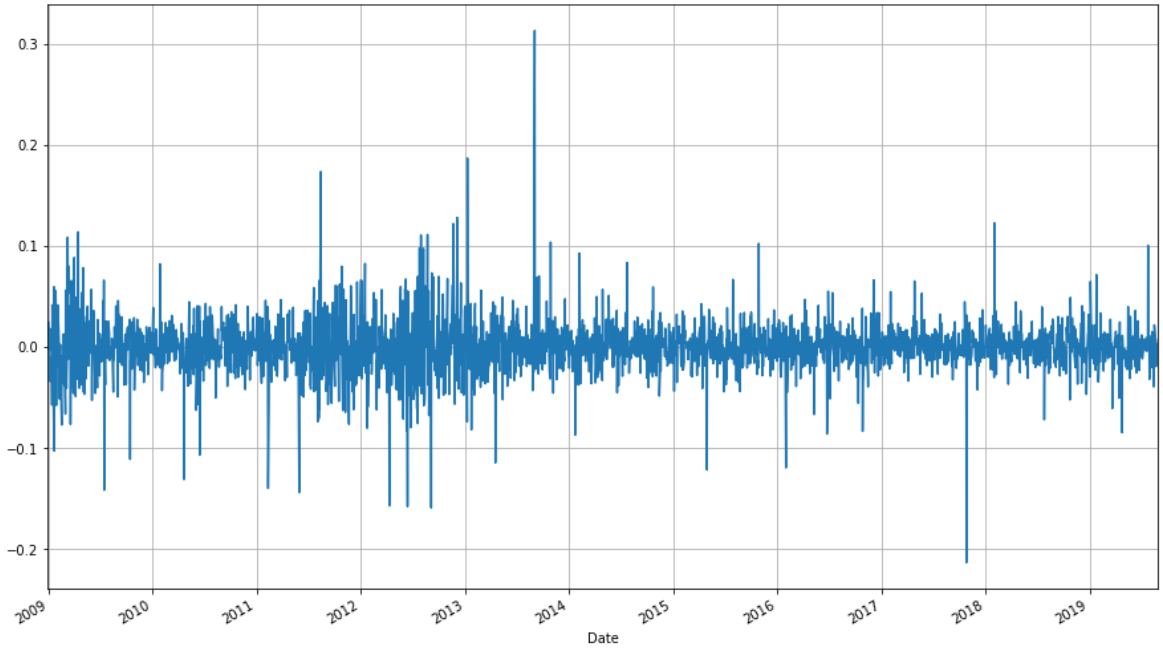
Ans.

พบว่าจากกราฟ หุ้น SBUX และ T มีแนวโน้มที่จะขึ้นทุกปี โดยเฉพาะ SBUX ช่วงปี 2018-2019ที่ขึ้นอย่างมาก และหุ้น ZNGA และ NOK มีแนวโน้มที่คงที่ และหุ้น TWTR มีแนวโน้มที่ไม่แน่นอนคือคงที่และขึ้นลงสลับกัน

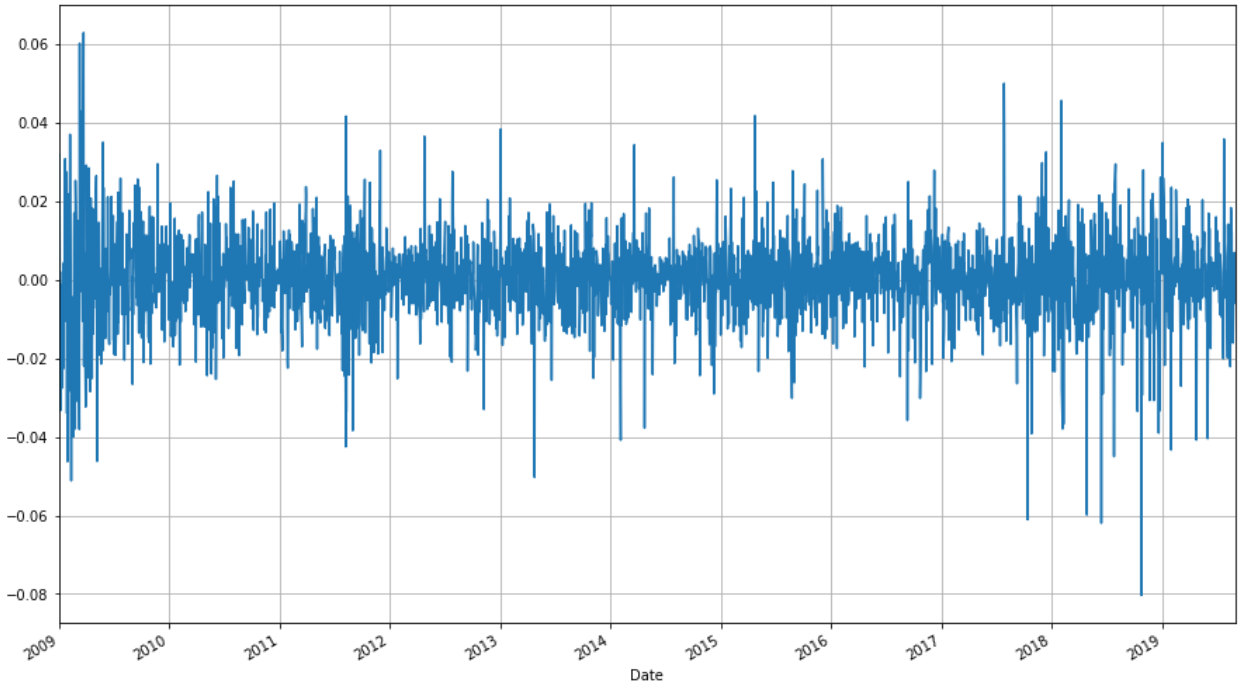
Historical price



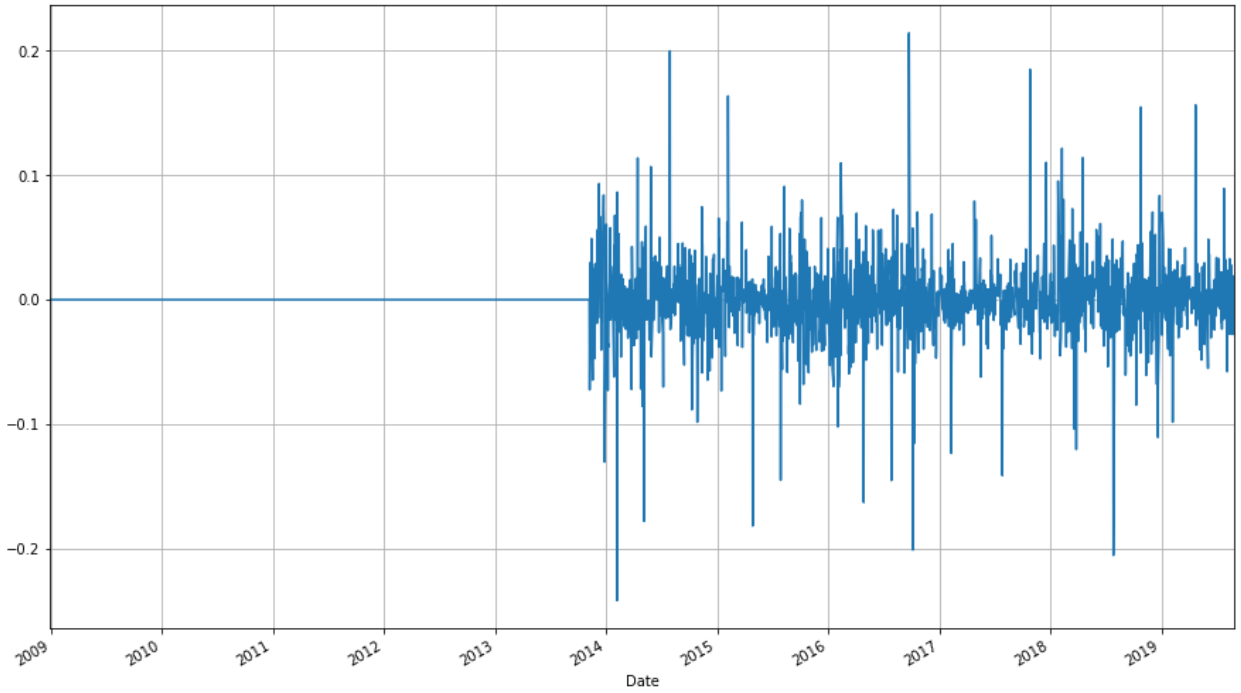
Simple daily returns of NOK



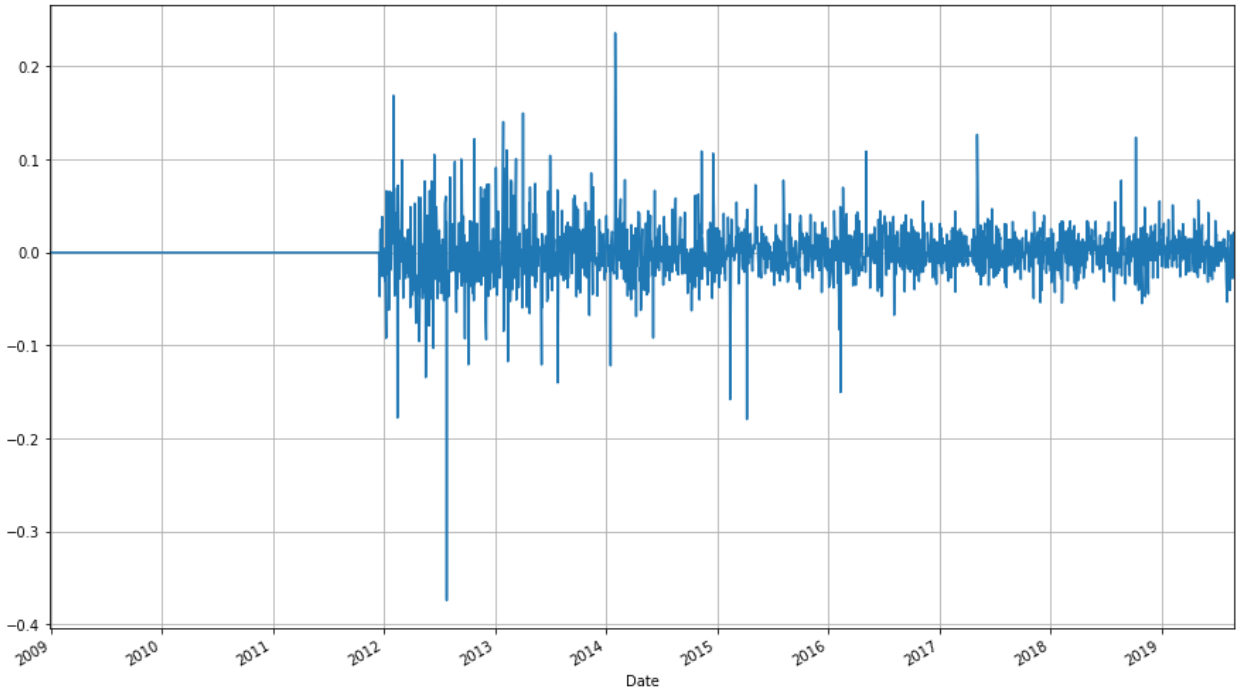
Simple daily returns of T



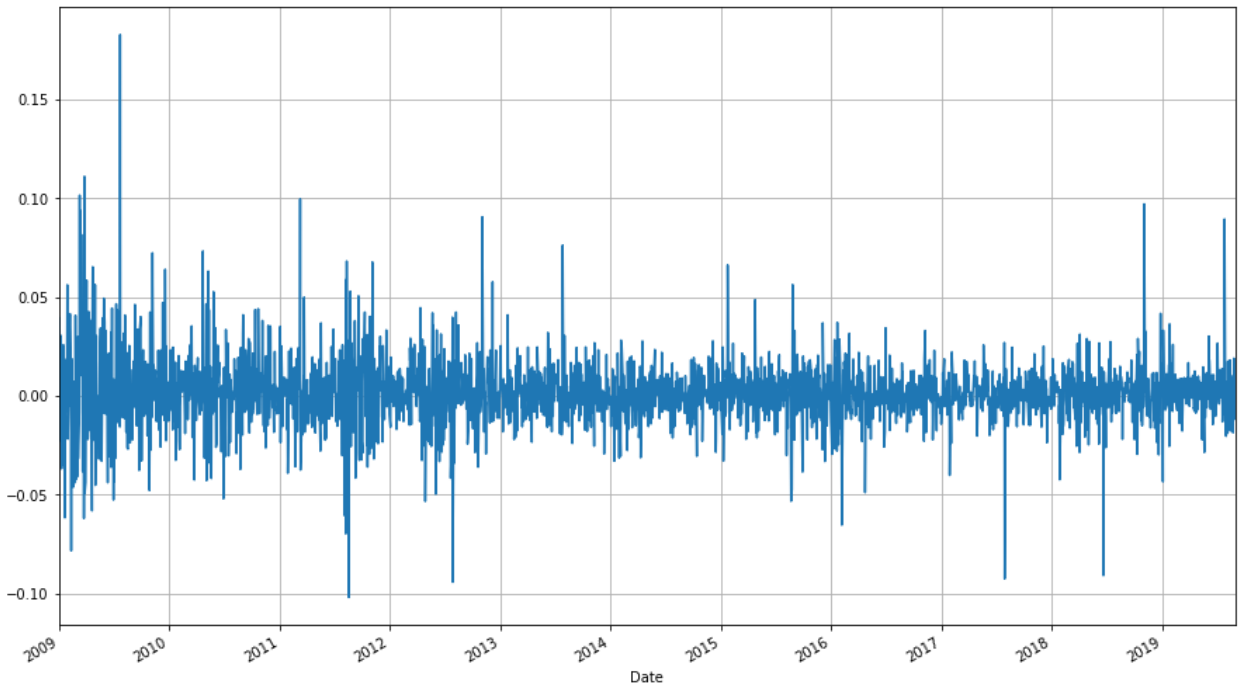
Simple daily return TWTR



Simple daily returns of ZNGA

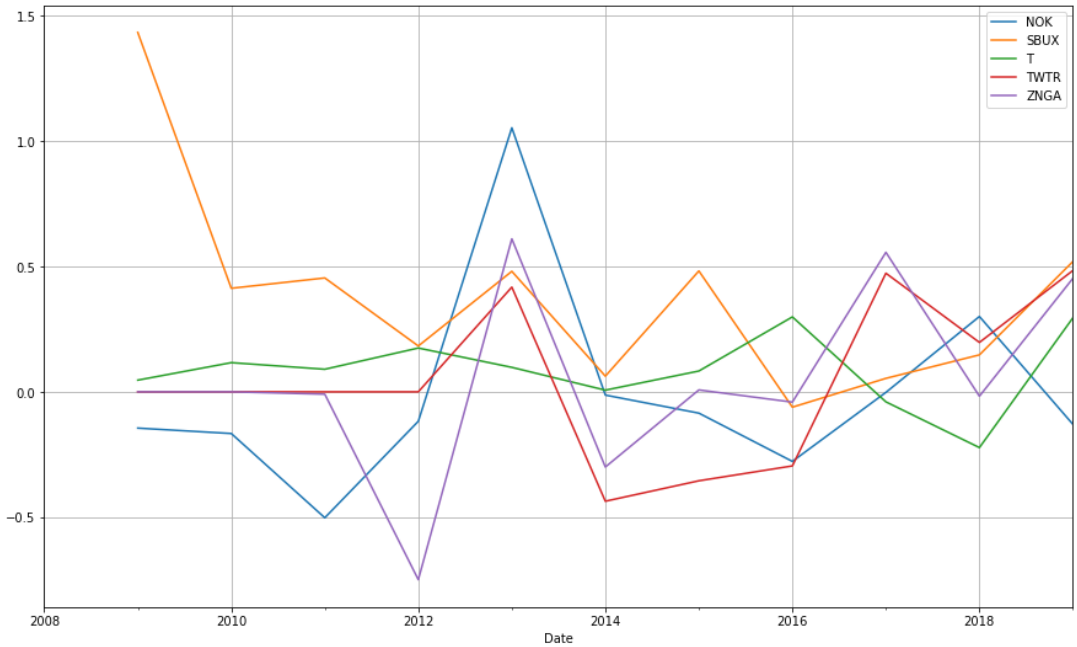


Simple daily returns of SBUX



3. Check how many days in a year in the historical data and plot annualize returns.
Ans. 2685 days

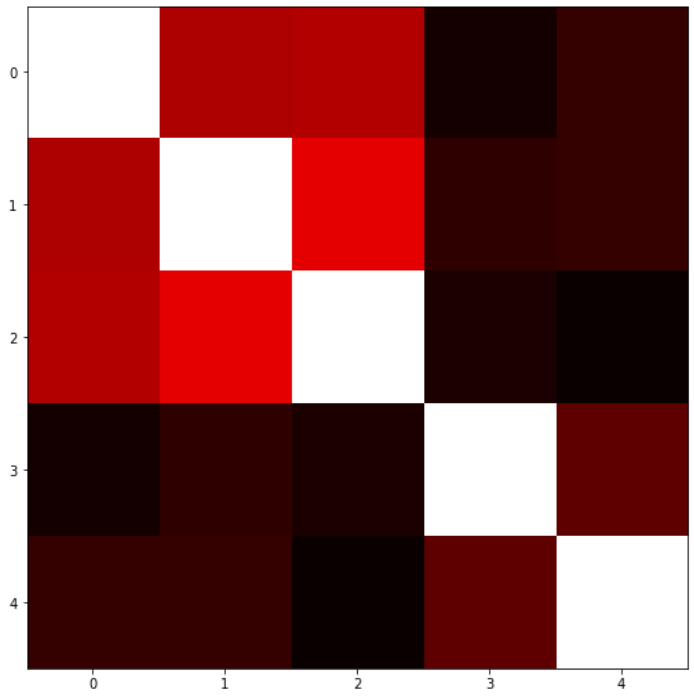
Annualize returns



4. Compute covariances and correlation efficients of daily returns of 5 stocks and show as a matrix table and a heat map. Describe what you have observed.
Ans.

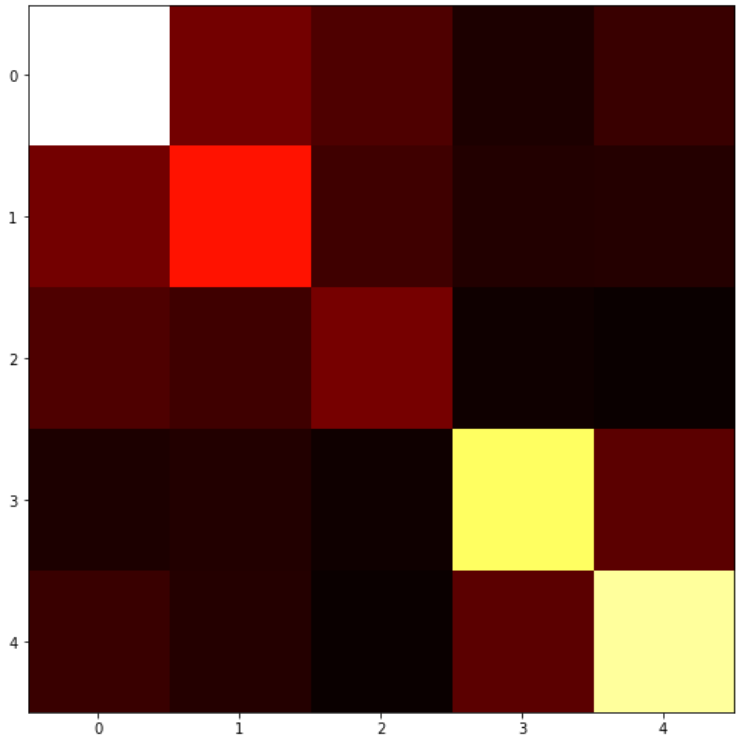
covariances of daily returns

	NOK	SBUX	T	TWTR	ZNGA
NOK	0.000735	0.000122	0.000083	0.000028	0.000060
SBUX	0.000122	0.000292	0.000066	0.000033	0.000038
T	0.000083	0.000066	0.000126	0.000014	0.000007
TWTR	0.000028	0.000033	0.000014	0.000620	0.000096
ZNGA	0.000060	0.000038	0.000007	0.000096	0.000661

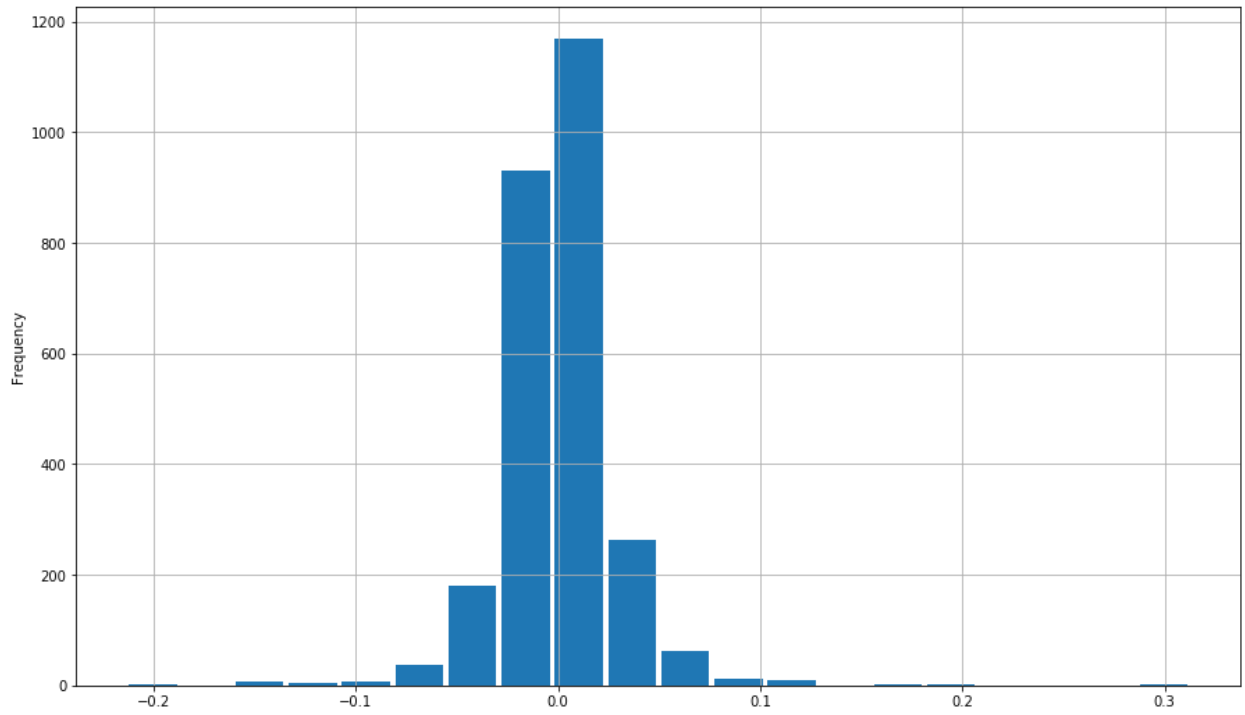


Correlation efficients of daily returns

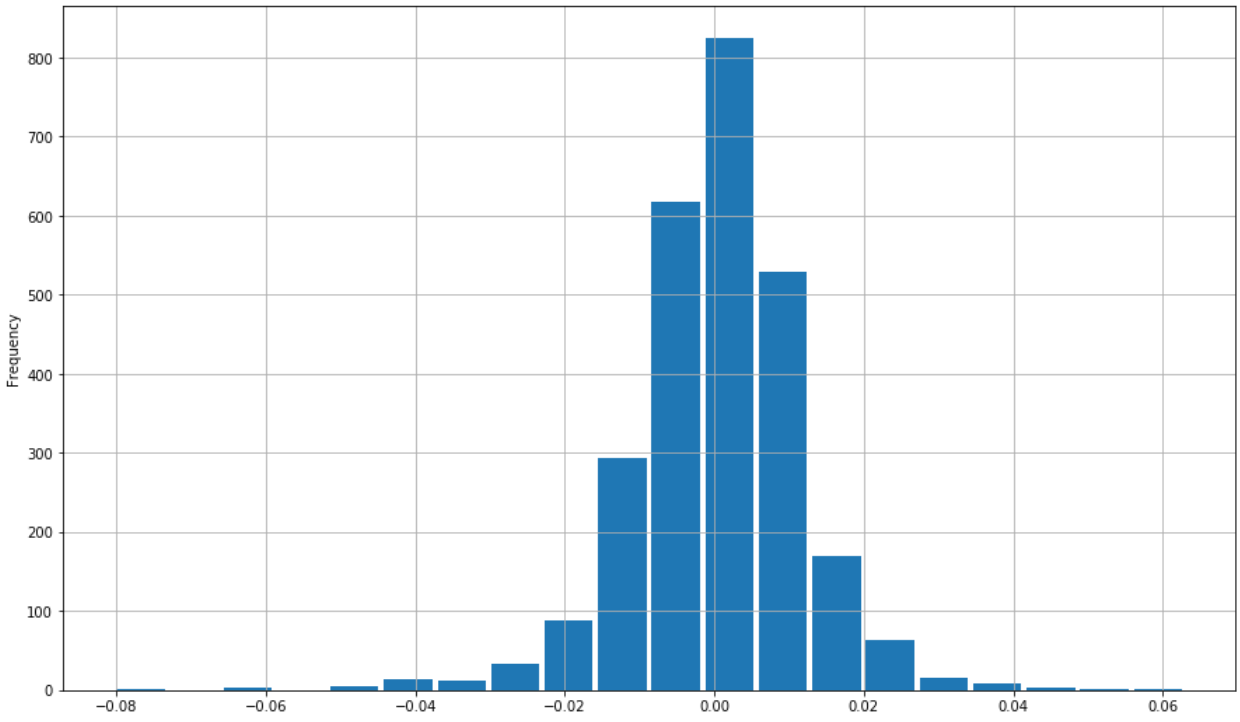
	NOK	SBUX	T	TWTR	ZNGA
NOK	1.000000	0.262714	0.271907	0.041711	0.086347
SBUX	0.262714	1.000000	0.341397	0.077946	0.085354
T	0.271907	0.341397	1.000000	0.050938	0.024337
TWTR	0.041711	0.077946	0.050938	1.000000	0.149681
ZNGA	0.086347	0.085354	0.024337	0.149681	1.000000



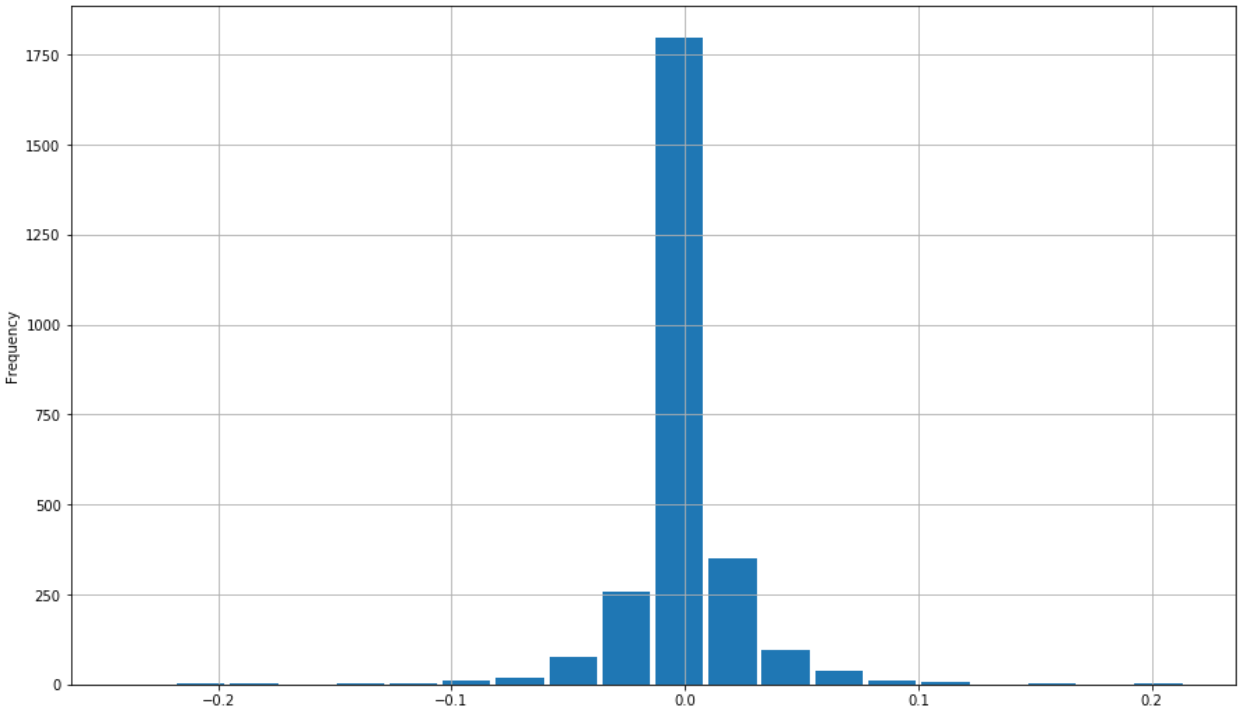
5. Plot histograms of daily return, calculate mean, variance, skewness, kurtosis, and verify if the distribution is normal. Find out what is a good method to verify by yourself.
Ans.
histograms of daily return of NOK



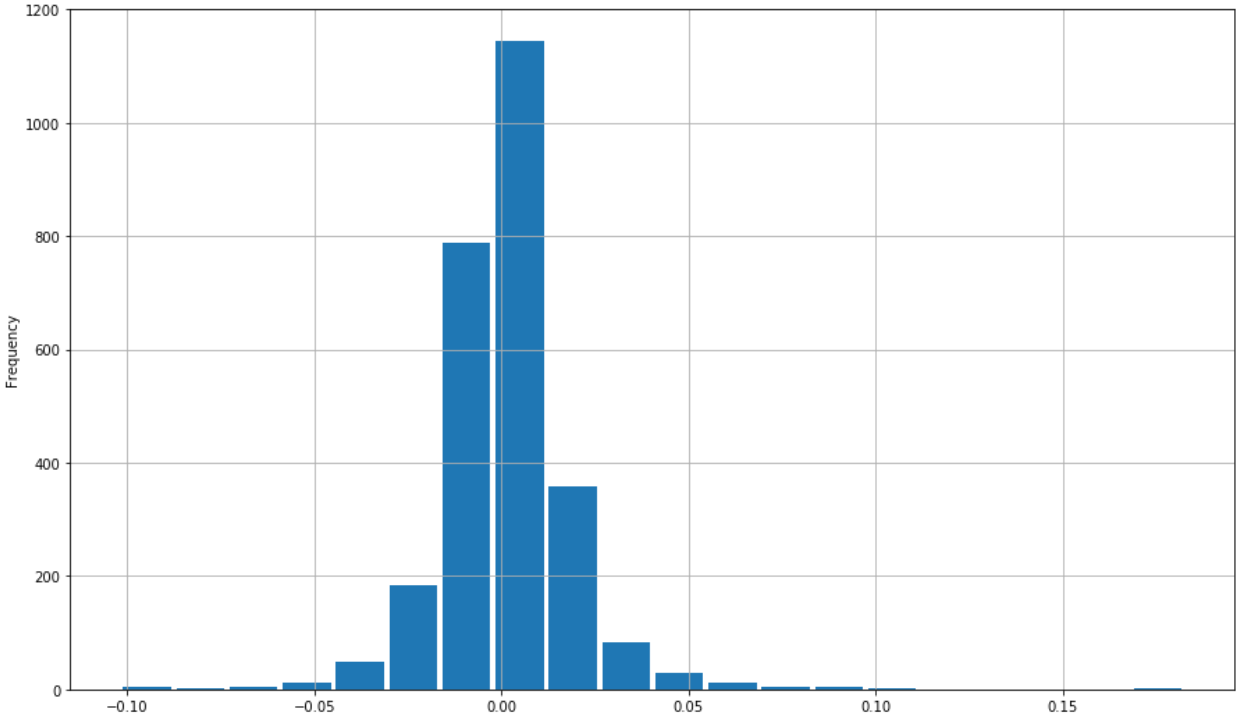
histograms of daily return of T



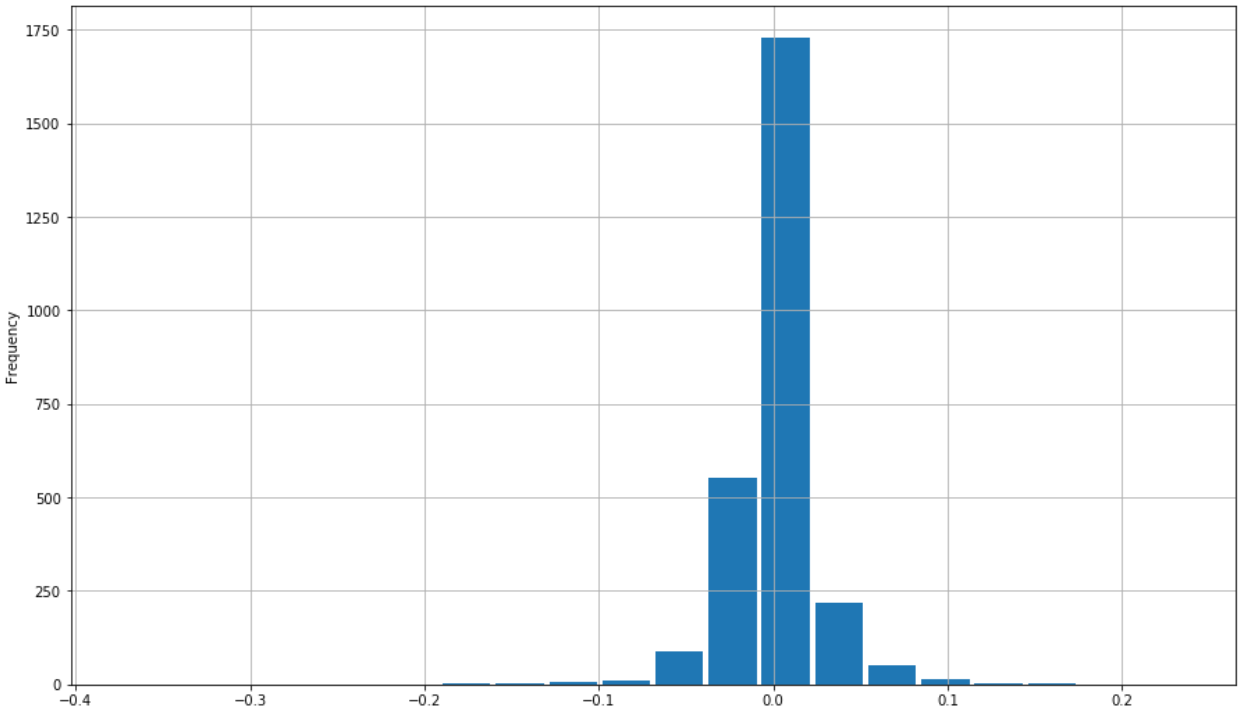
histograms of daily return of TWTR



histograms of daily return of SBUX



histograms of daily return of ZNGA



Mean
NOK 0.000088
SBUX 0.001326
T 0.000365
TWTR 0.000295
ZNGA 0.000150
dtype: float64

Variance
NOK 0.000735
SBUX 0.000292
T 0.000126
TWTR 0.000620
ZNGA 0.000661
dtype: float64

Skewness
NOK 0.344001
SBUX 0.768851
T -0.414410
TWTR -0.460278

ZNGA -0.857184
dtype: float64

Kurtosis
NOK 13.098367
SBUX 10.042502
T 4.105987
TWTR 19.315937
ZNGA 26.117864
dtype: float64

6. Implement example 2.4 on page 53 with your 5 stocks. Find the upper bound and lower bound of prices if T = 5, 21, 63, 250 days. Analyze your results. What can you observe and conclude?
Ans.
7. Find historical volatility from your daily historical data and annualize it.
Ans.
Historical volatility of NOK is 0.0001562655591374085
Historical volatility of SBUX is 0.00022650839519665285
Historical volatility of T is 6.0299893460282944e-05
Historical volatility of TWTR is 7.25345128651723e-05
Historical volatility of ZNGA is 0.00026850785986977203

8. Compute range-based volatility by Parkinson, and Garman and Klass.
Ans. Garman and Klass
{'NOK': 0.152362479779818,
'T': 0.12286088844796891,
'SBUX': 0.13981197502720322,
'TWTR': 0.28508946333475815,
'ZNGA': 0.3589283372233685}

Parkinson
{'NOK': 0.151030560785813,
'T': 0.12211758966812479,
'SBUX': 0.1427232090248033,
'TWTR': 0.28198113003695097,
'ZNGA': 0.3112560997766154}

9. Compute EWMA volatility using lambda=0.94.