D214 - Task 2 - Data Analytics Report and Executive Summary

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Data Analytics 01/01/2022

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Data Extraction and Preparation

Import Python Packages

```
In [1]:  import matplotlib.pyplot as plt
         import numpy as np
         import pandas as pd
         from itertools import product
         from pandas.plotting import lag_plot
         import seaborn as sns

         from sklearn import preprocessing
         from statsmodels.graphics.tsaplots import plot_pacf
         from statsmodels.graphics.tsaplots import plot_acf
         from statsmodels.tsa.statespace.sarimax import SARIMAX
         from statsmodels.tsa.stattools import adfuller
         from statsmodels.tsa.arima_model import ARIMA
         from statsmodels.tsa.seasonal import seasonal_decompose
         from sklearn.metrics import mean_squared_error, mean_absolute_error
         from pmdarima.arima import auto_arima

         import datetime
         import warnings
         warnings.filterwarnings('ignore')
         %matplotlib inline
```

Read in the existing data

```python
In [2]: CSCO = pd.read_csv("Datasets/CSCO.csv")
        ADBE = pd.read_csv("Datasets/ADBE.csv")
        ORCL = pd.read_csv("Datasets/ORCL.csv")
        AMZN = pd.read_csv("Datasets/AMZN.csv")
        INTC = pd.read_csv("Datasets/INTC.csv")
        MSFT = pd.read_csv("Datasets/MSFT.csv")
        NVDA = pd.read_csv("Datasets/NVDA.csv")
        IBM = pd.read_csv("Datasets/IBM.csv")
        NFLX = pd.read_csv("Datasets/NFLX.csv")
        GOOGL = pd.read_csv("Datasets/GOOGL.csv")
        AAPL = pd.read_csv("Datasets/AAPL.csv")
        CRM = pd.read_csv("Datasets/CRM.csv")
        META = pd.read_csv("Datasets/META.csv")
        TSLA = pd.read_csv("Datasets/TSLA.csv")
```

```python
In [3]: print("Date Values in AAPL Data:  ", AAPL['Date'].value_counts().sum())
        print("Date Values in ADBE Data:  ", ADBE['Date'].value_counts().sum())
        print("Date Values in ORCL Data:  ", ORCL['Date'].value_counts().sum())
        print("Date Values in AMZN Data:  ", AMZN['Date'].value_counts().sum())
        print("Date Values in INTC Data:  ", INTC['Date'].value_counts().sum())
        print("Date Values in MSFT Data:  ", MSFT['Date'].value_counts().sum())
        print("Date Values in NVDA Data:  ", NVDA['Date'].value_counts().sum())
        print("Date Values in IBM Data:   ", IBM['Date'].value_counts().sum())
        print("Date Values in NFLX Data:  ", NFLX['Date'].value_counts().sum())
        print("Date Values in GOOGL Data: ", GOOGL['Date'].value_counts().sum()
        print("Date Values in CRM Data:   ", CRM['Date'].value_counts().sum())
        print("Date Values in CSCO Data:  ", CSCO['Date'].value_counts().sum())
        print("Date Values in META Data:  ", META['Date'].value_counts().sum())
        print("Date Values in TSLA Data:  ", TSLA['Date'].value_counts().sum())
```

```
Date Values in AAPL Data:    3271
Date Values in ADBE Data:    3271
Date Values in ORCL Data:    3271
Date Values in AMZN Data:    3271
Date Values in INTC Data:    3271
Date Values in MSFT Data:    3271
Date Values in NVDA Data:    3271
Date Values in IBM Data:     3271
Date Values in NFLX Data:    3271
Date Values in GOOGL Data:   3271
Date Values in CRM Data:     3271
Date Values in CSCO Data:    3271
Date Values in META Data:    2688
Date Values in TSLA Data:    3148
```

AAPL.Date = pd.to_datetime(AAPL.Date) ADBE.Date = pd.to_datetime(ADBE.Date) ORCL.Date = pd.to_datetime(ORCL.Date) AMZN.Date = pd.to_datetime(AMZN.Date) INTC.Date = pd.to_datetime(INTC.Date) MSFT.Date = pd.to_datetime(MSFT.Date) NVDA.Date = pd.to_datetime(NVDA.Date) IBM.Date = pd.to_datetime(IBM.index) NFLX.Date = pd.to_datetime(NFLX.Date) GOOGL.Date = pd.to_datetime(GOOGL.Date) CRM.Date = pd.to_datetime(CRM.Date) CSCO.Date = pd.to_datetime(CSCO.Date) META.Date = pd.to_datetime(META.Date) TSLA.Date = pd.to_datetime(TSLA.Date)

Join the DataFrames together using a common key

```
In [4]: column_names = ['AAPL', 'ADBE', 'ORCL', 'AMZN', 'INTC', 'MSFT', 'NVDA',
                         'NFLX', 'GOOGL', 'CRM', 'CSCO']
```

```
In [5]: beginning_date = '2010-01-04'
        print(beginning_date)
```

```
2010-01-04
```

```
In [6]: index = pd.date_range(beginning_date, periods=3271, freq='B')
        df = pd.DataFrame(index=index, columns=column_names)
```

```
In [7]: df.to_csv("Datasets/df.csv")
        df = pd.read_csv("Datasets/df.csv")
```

```
In [8]: df = df.rename(columns={"Unnamed: 0":"Date"})
```

```
In [9]: df.Date = pd.to_datetime(df.Date)
```

```
In [10]: df["AAPL"] = AAPL["Close"]
         df["ADBE"] = ADBE["Close"]
         df["ORCL"] = ORCL["Close"]
         df["AMZN"] = AMZN["Close"]
         df["INTC"] = INTC["Close"]
         df["MSFT"] = MSFT["Close"]
         df["NVDA"] = NVDA["Close"]
         df["IBM"] = IBM["Close"]
         df["NFLX"] = NFLX["Close"]
         df["GOOGL"] = GOOGL["Close"]
         df["CRM"] = CRM["Close"]
         df["CSCO"] = CSCO["Close"]
```

```
In [11]: df.to_csv('DataSets/df.csv')
```

Review the datatypes contained within DataFrame

In [12]: `df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3271 entries, 0 to 3270
Data columns (total 13 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Date    3271 non-null   datetime64[ns]
 1   AAPL    3271 non-null   float64
 2   ADBE    3271 non-null   float64
 3   ORCL    3271 non-null   float64
 4   AMZN    3271 non-null   float64
 5   INTC    3271 non-null   float64
 6   MSFT    3271 non-null   float64
 7   NVDA    3271 non-null   float64
 8   IBM     3271 non-null   float64
 9   NFLX    3271 non-null   float64
 10  GOOGL   3271 non-null   float64
 11  CRM     3271 non-null   float64
 12  CSCO    3271 non-null   float64
dtypes: datetime64[ns](1), float64(12)
memory usage: 332.3 KB
```

Review value counts to ensure no missing values

In [13]:
```python
for column in column_names:
    column_name = df[column].name

    print(column_name,"Column Values:", df[column].value_counts().sum()
```

```
AAPL Column Values: 3271
ADBE Column Values: 3271
ORCL Column Values: 3271
AMZN Column Values: 3271
INTC Column Values: 3271
MSFT Column Values: 3271
NVDA Column Values: 3271
IBM Column Values: 3271
NFLX Column Values: 3271
GOOGL Column Values: 3271
CRM Column Values: 3271
CSCO Column Values: 3271
```

```
In [14]: df.isna().sum()
```

```
Out[14]: Date     0
         AAPL     0
         ADBE     0
         ORCL     0
         AMZN     0
         INTC     0
         MSFT     0
         NVDA     0
         IBM      0
         NFLX     0
         GOOGL    0
         CRM      0
         CSCO     0
         dtype: int64
```

**Review a statistical summary of each variable and plot the distribution**

```
In [15]: df.describe()
```

Out[15]:

	AAPL	ADBE	ORCL	AMZN	INTC	MSFT	NV
count	3271.000000	3271.000000	3271.000000	3271.000000	3271.000000	3271.000000	3271.000
mean	51.297154	186.022299	46.262375	58.905287	36.492317	100.072644	50.555
std	47.344344	173.466083	16.863128	54.085034	12.912266	88.234393	69.480
min	6.858929	22.690001	21.459999	5.430500	17.670000	23.010000	2.220
25%	18.965536	42.910000	33.465000	13.326250	24.644999	31.809999	3.990
50%	29.812500	97.720001	41.689999	36.382500	34.340000	55.700001	11.890
75%	56.761250	287.955001	53.715000	93.138001	48.110001	139.044999	62.021
max	182.009995	688.369995	103.650002	186.570496	68.470001	343.109985	333.760

Additionally, a histogram distribution plot has been included for each of the companies closing prices.

```
In [16]: for column in column_names:
             column_name = df[column].name
             plt.figure(figsize=(5,3))
             plt.title(column_name)
             plt.xlabel("Stock Price")
             df[column_name].plot(kind='hist', edgecolor='black')
```

ORCL

AMZN

INTC

MSFT

NVDA

IBM

CRM
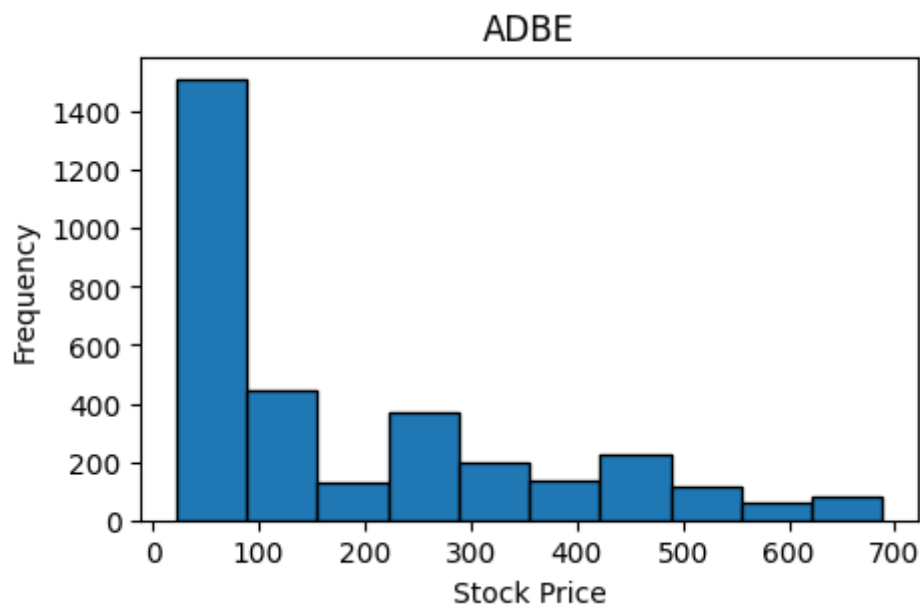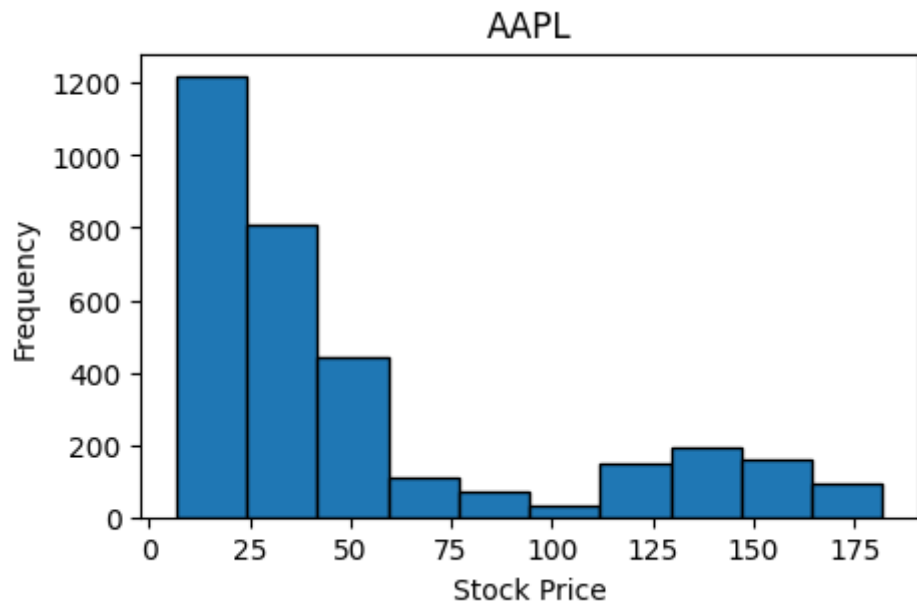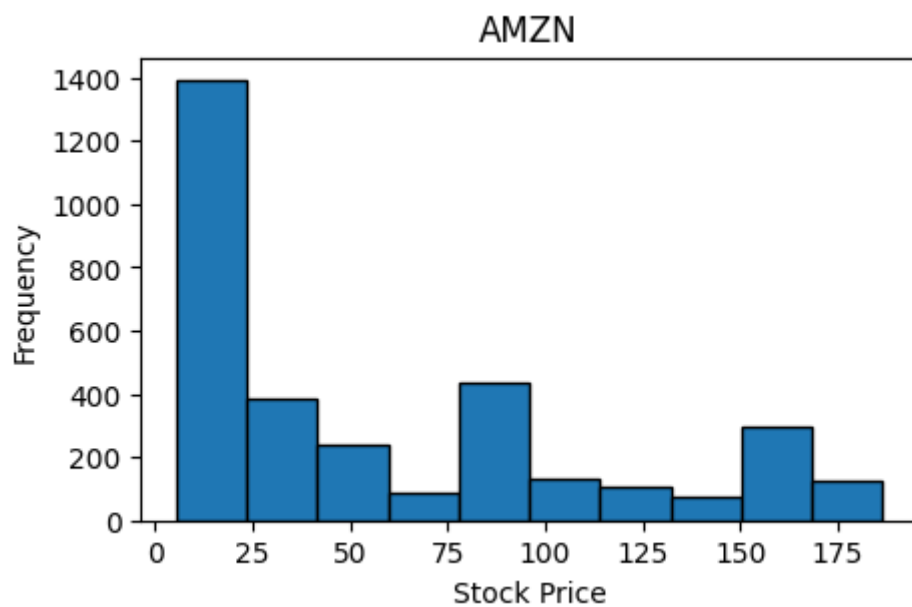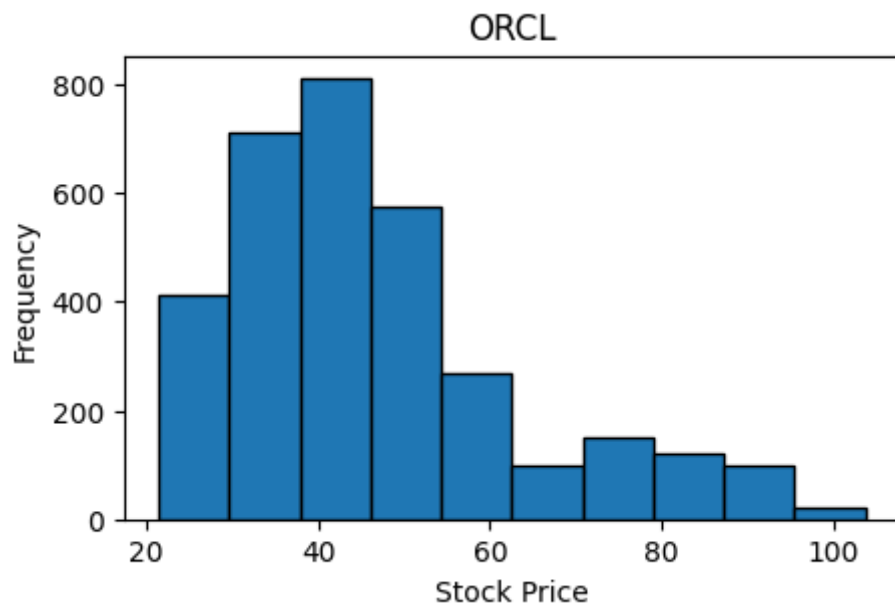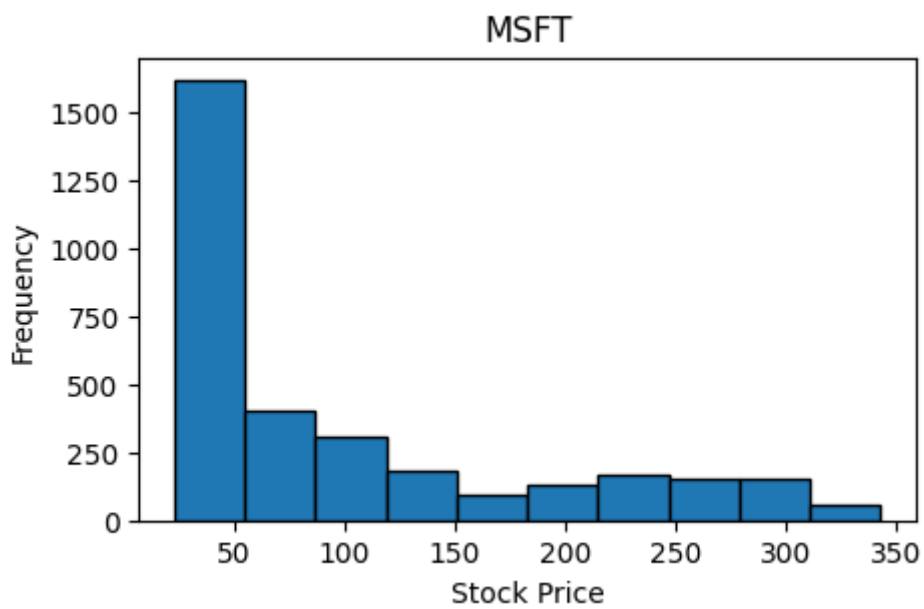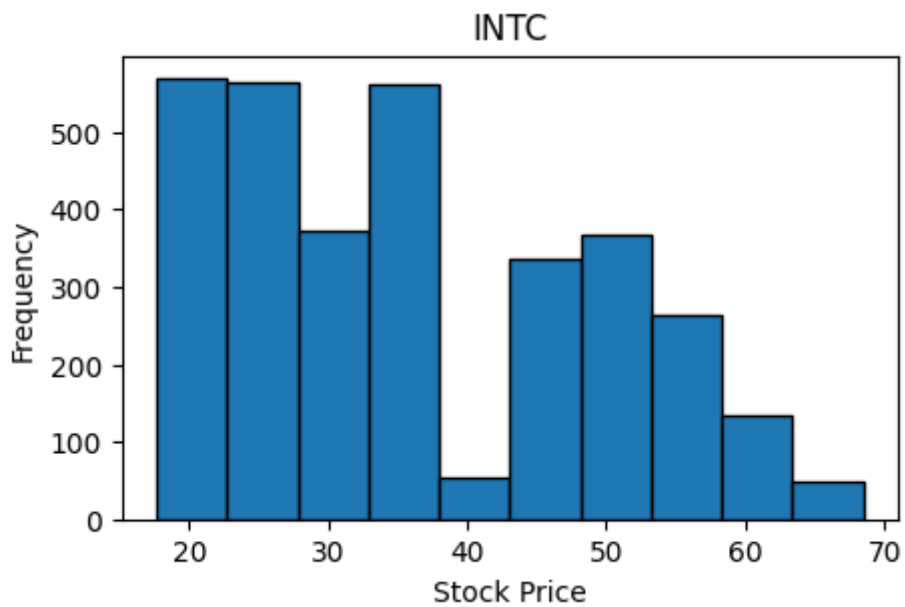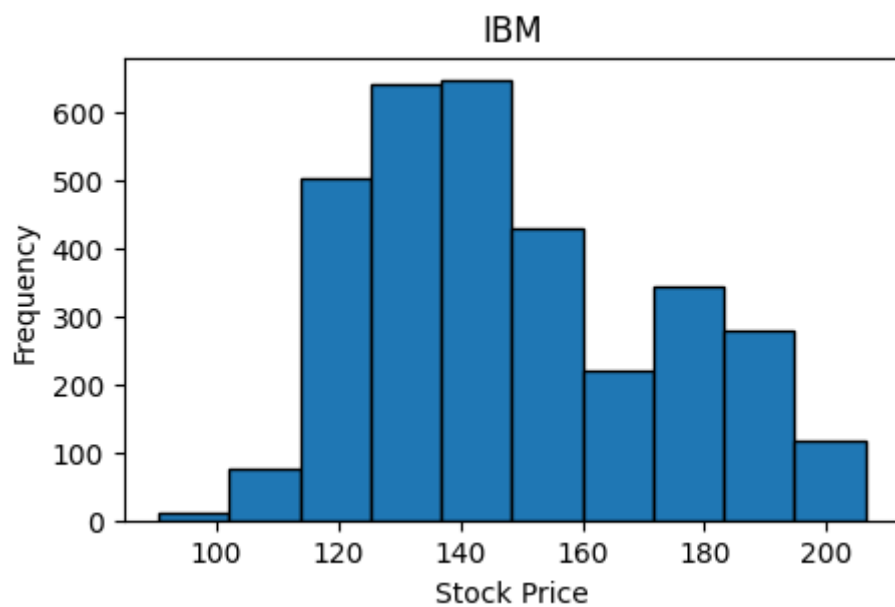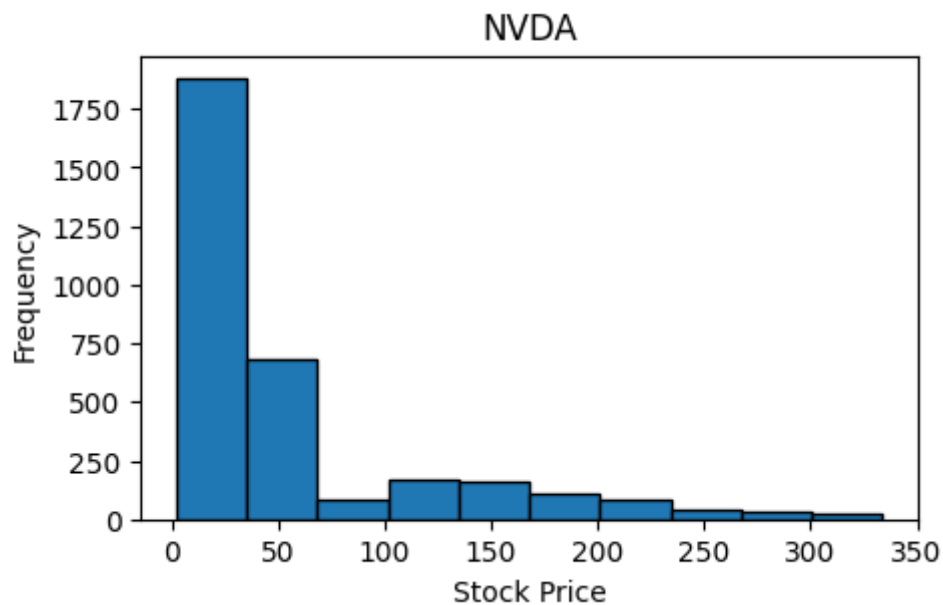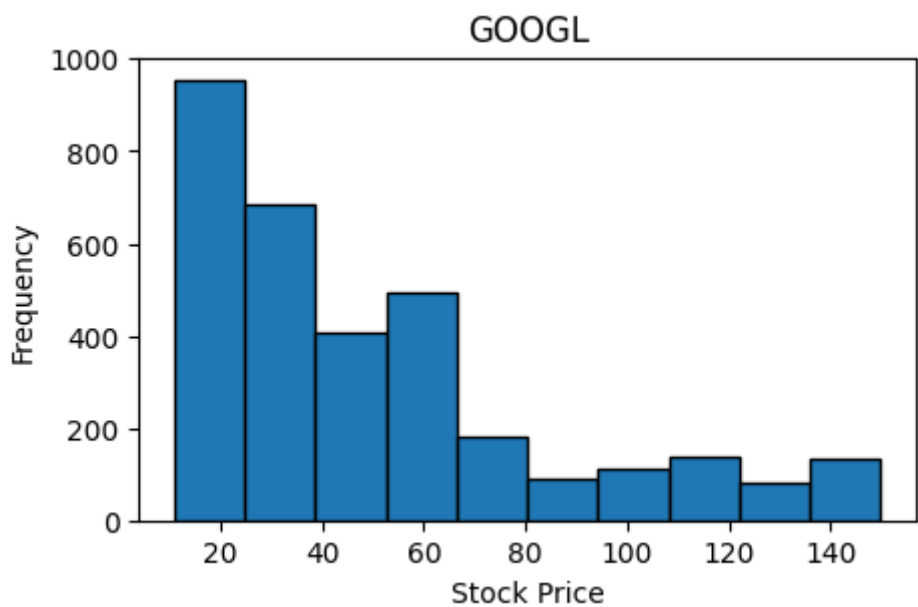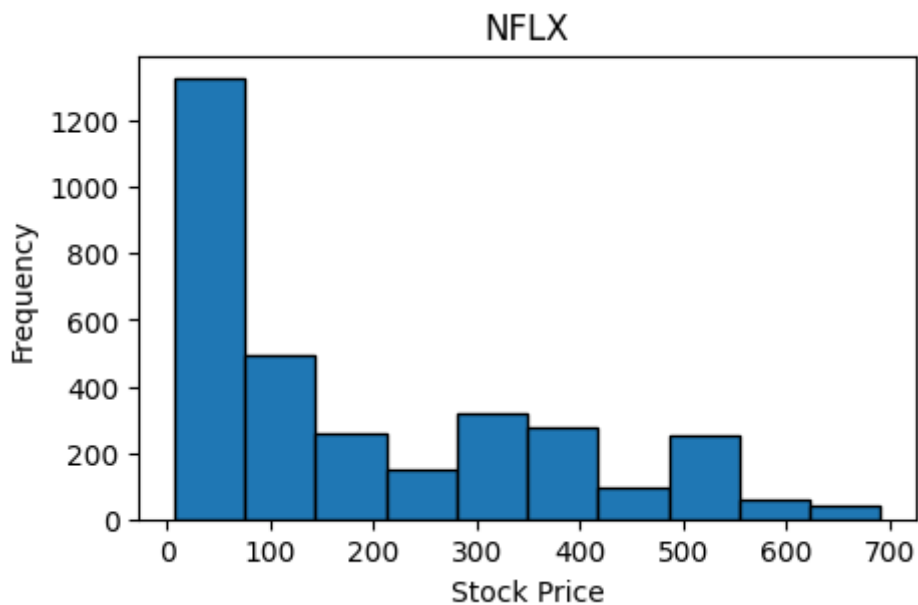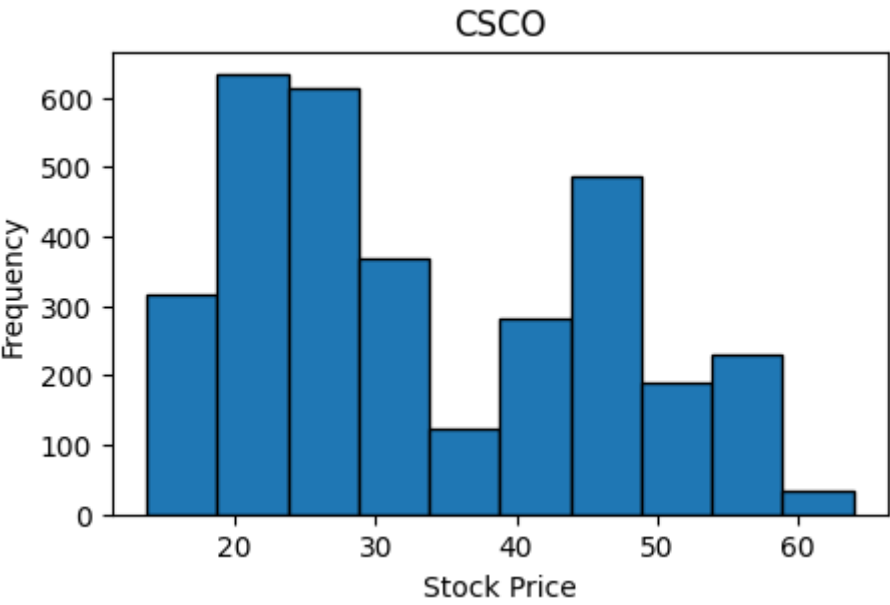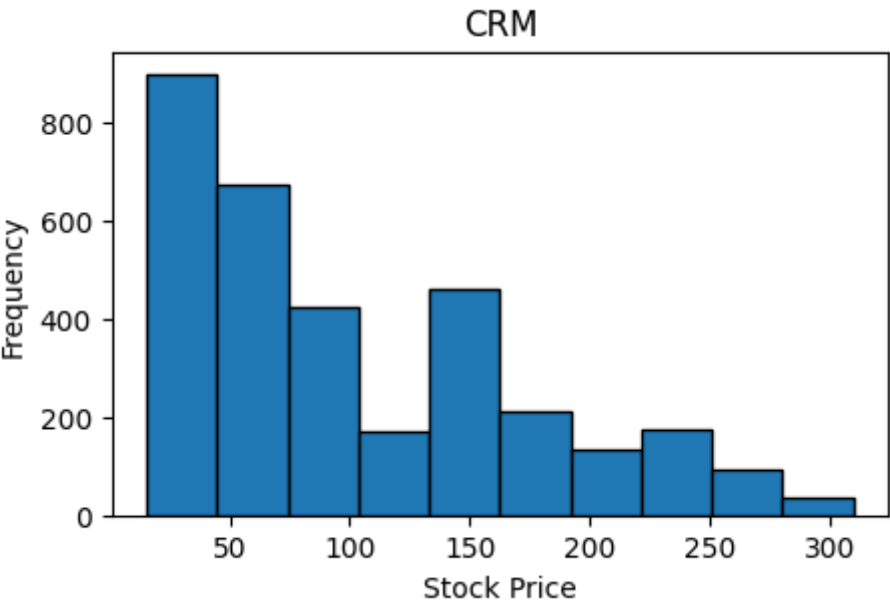
CSCO

Check for null values

```
In [17]: df.isnull().sum()
```

```
Out[17]: Date      0
         AAPL      0
         ADBE      0
         ORCL      0
         AMZN      0
         INTC      0
         MSFT      0
         NVDA      0
         IBM       0
         NFLX      0
         GOOGL     0
         CRM       0
         CSCO      0
         dtype: int64
```

Analysis

Exploratory Data Analysis

```
In [18]: for column in column_names:
             column_name = df[column].name
             result = seasonal_decompose(df[column], model='multiplicative', per:
             result.plot()
```

ADBE

ORCL

AMZN

INTC

GOOGL

CRM

CSCO
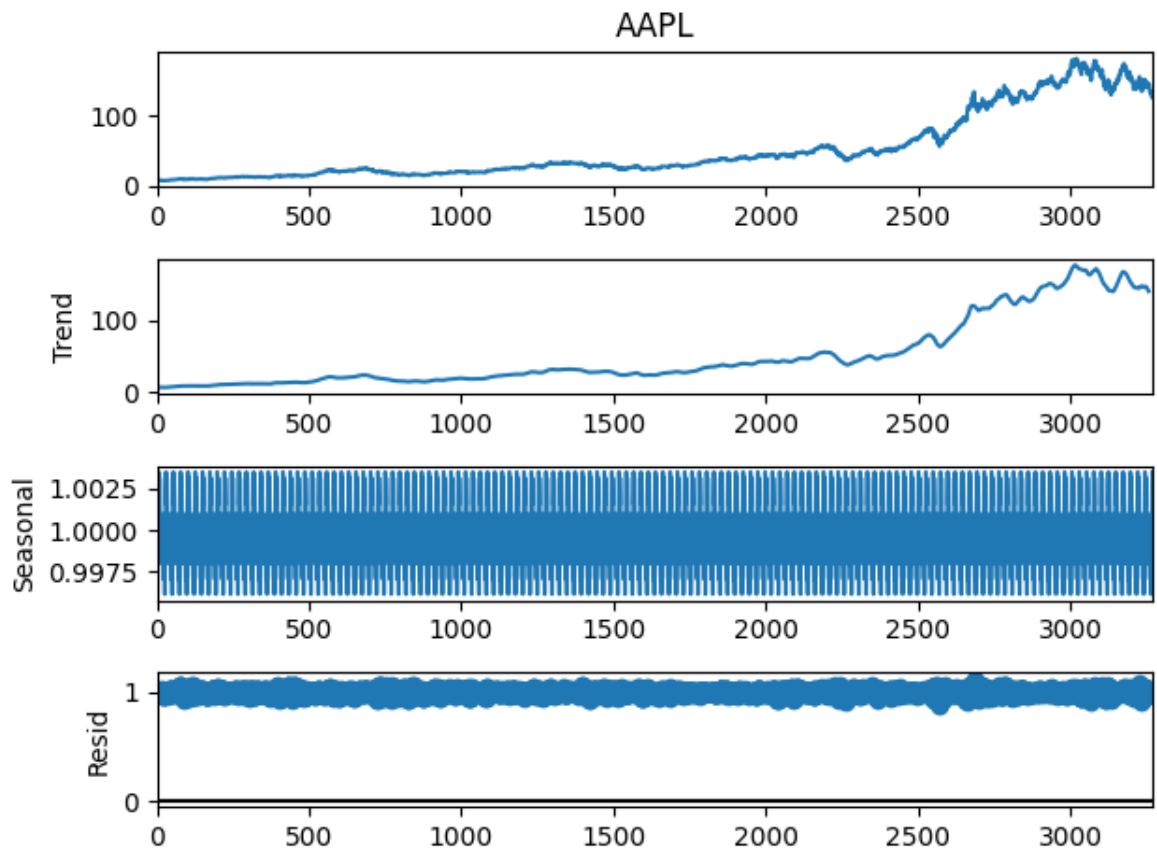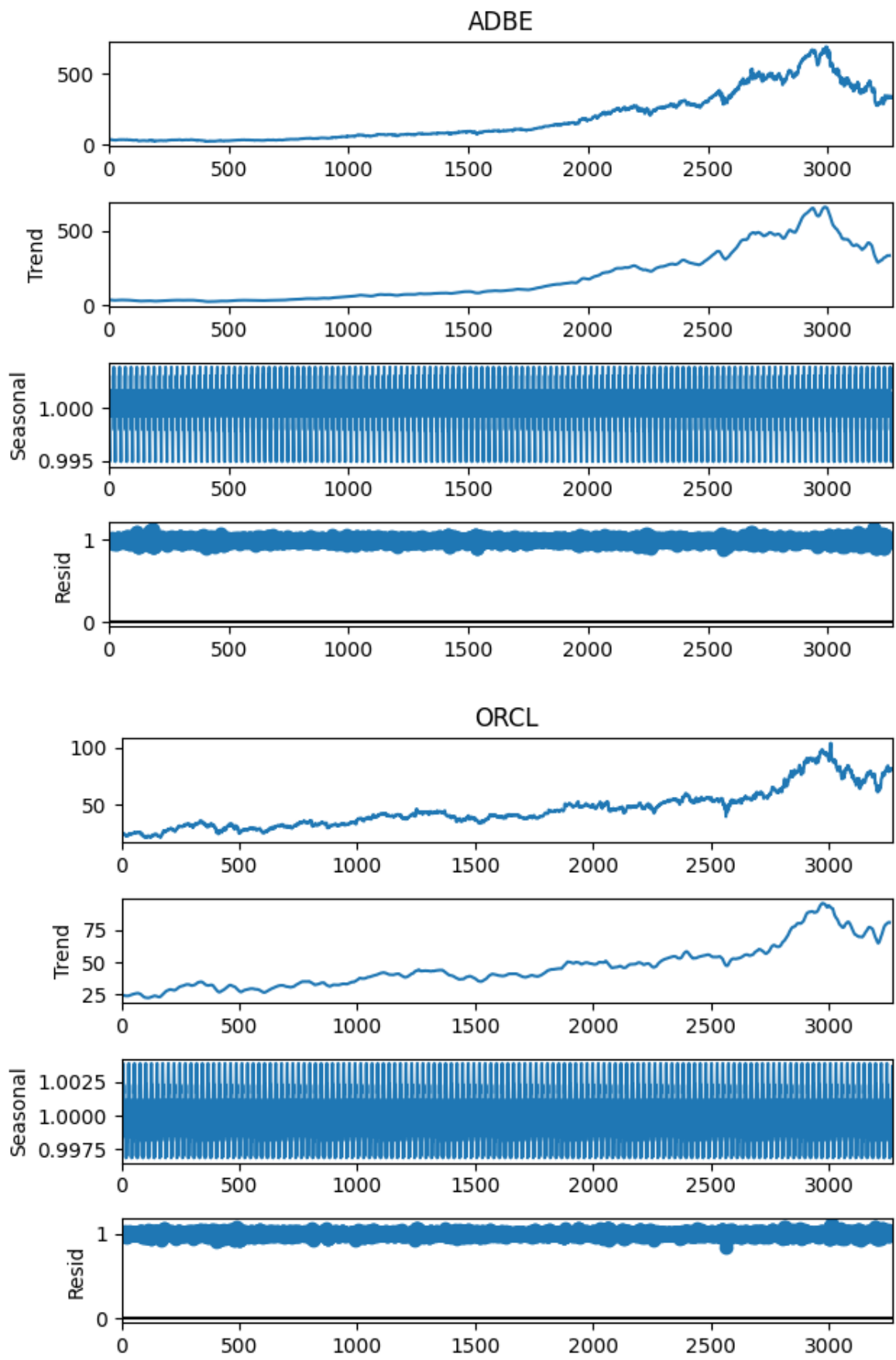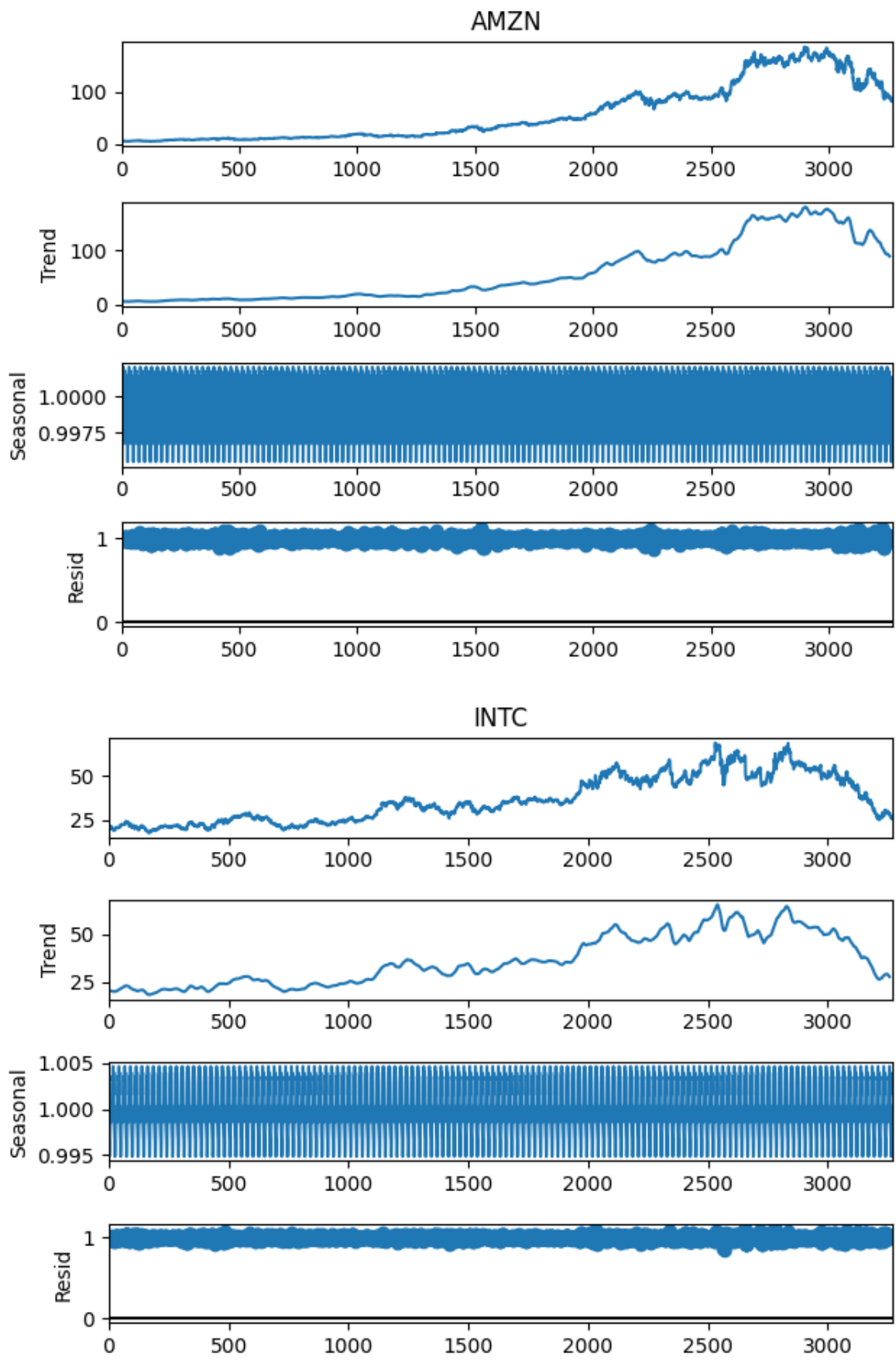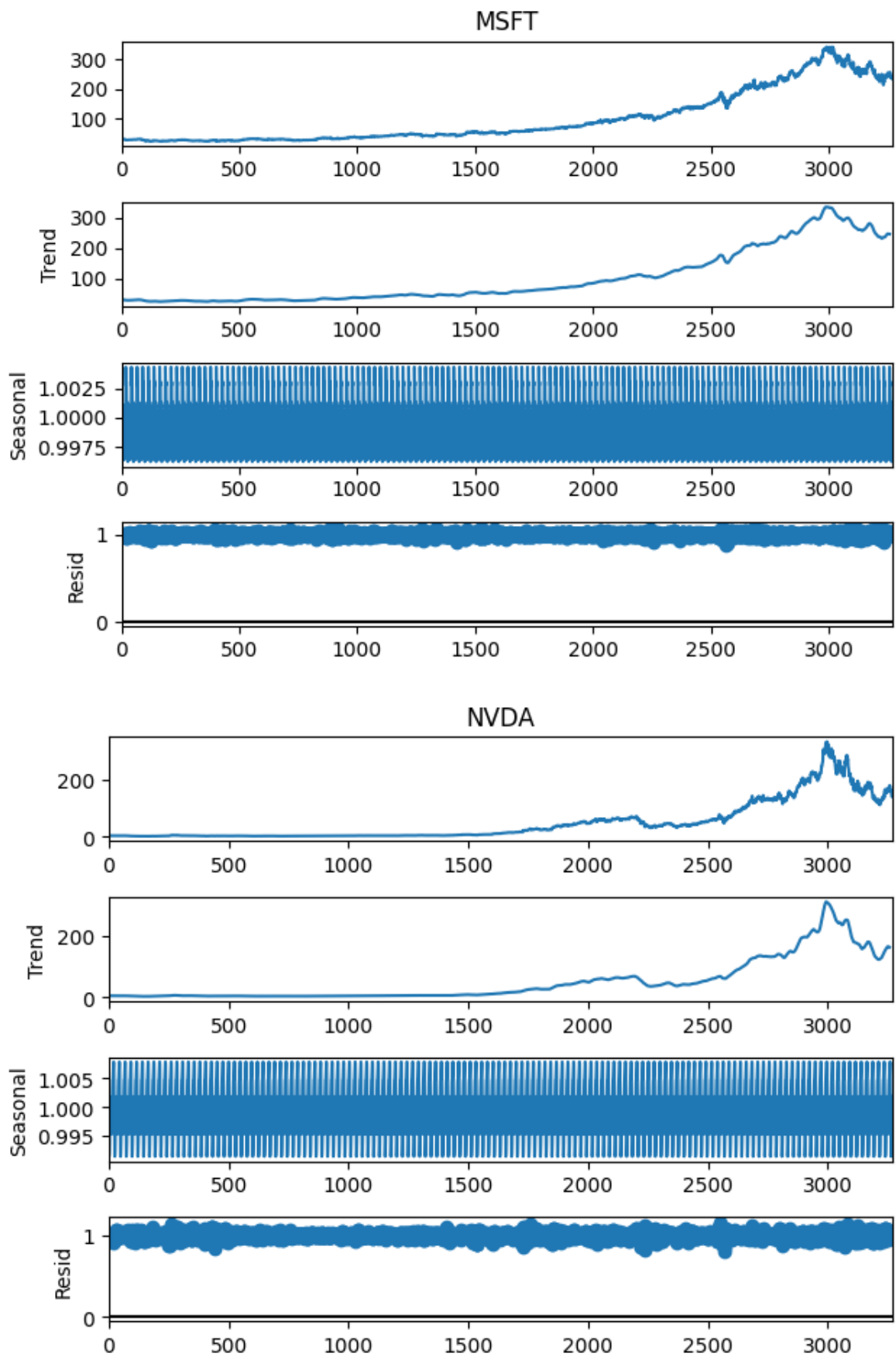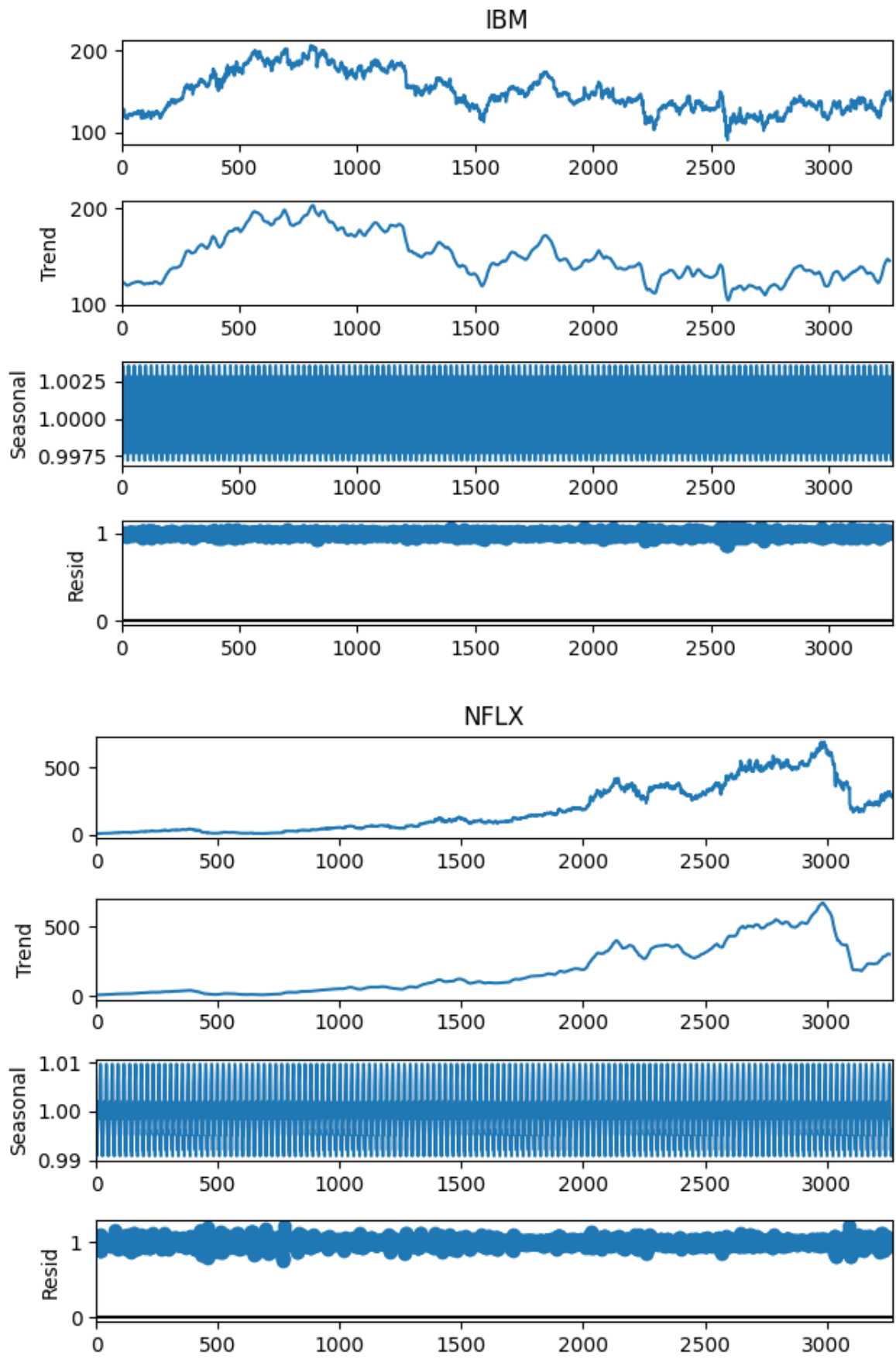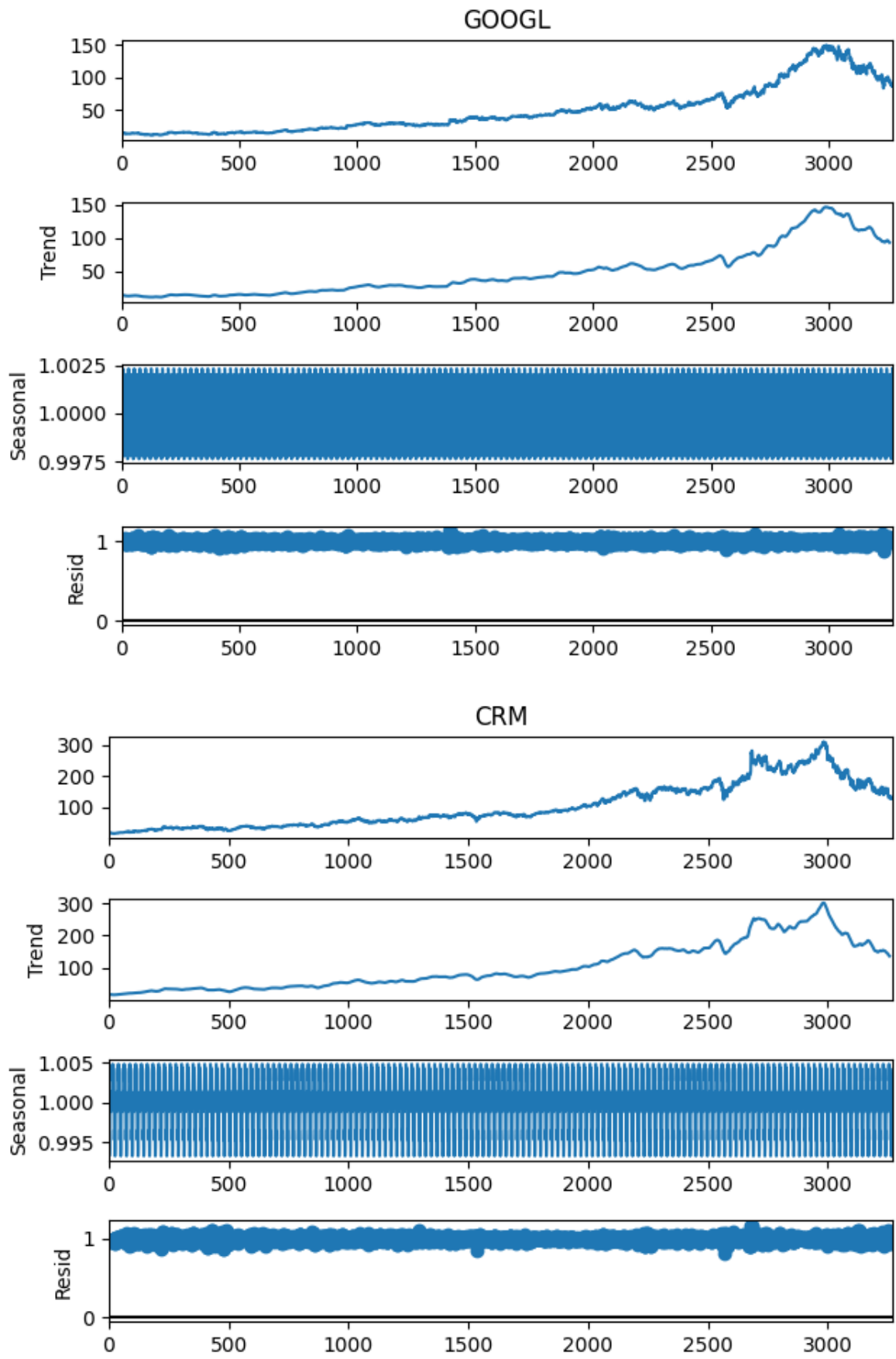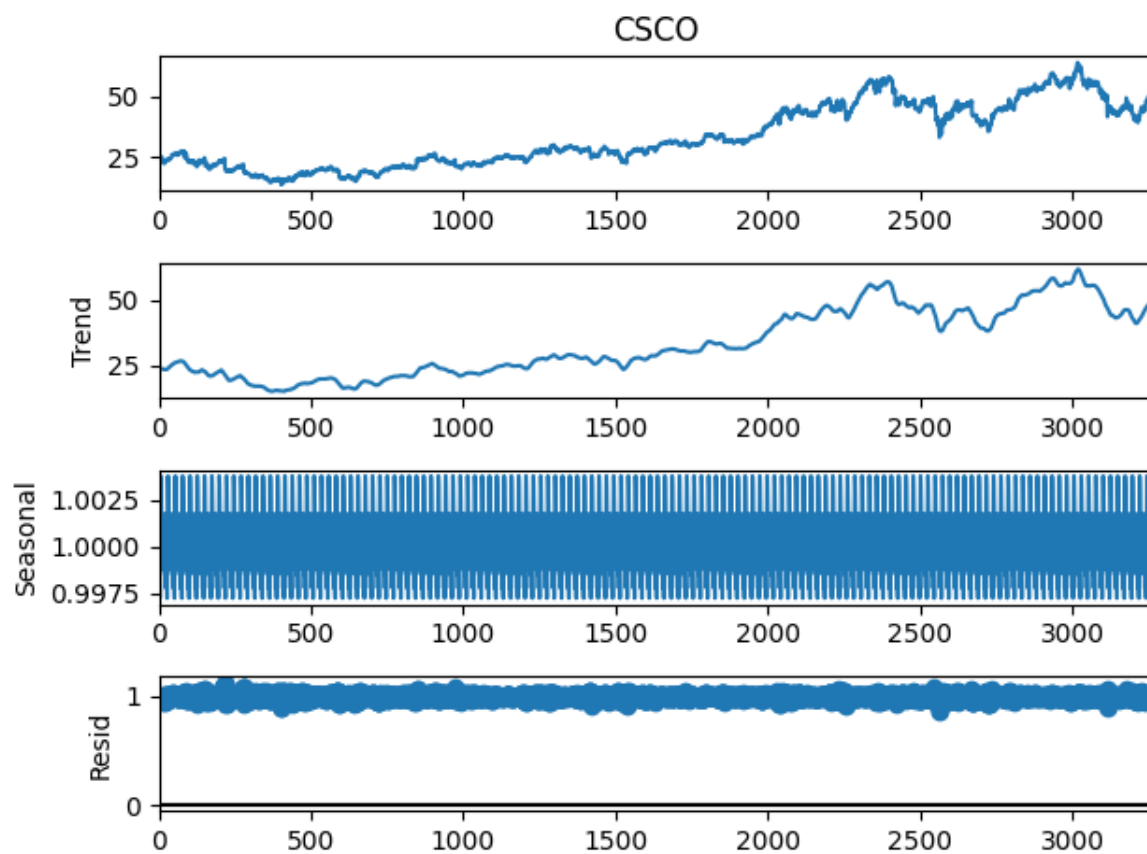
```
In [19]: for column in column_names:
             column_name = df[column].name
             plt.figure(figsize=(5,3))
             lag_plot(df[column_name], lag=3)
             plt.title(str(column_name)+' Stock - Autocorrelation plot with lag =
             plt.show()
```

AAPL Stock - Autocorrelation plot with lag = 3

ADBE Stock - Autocorrelation plot with lag = 3
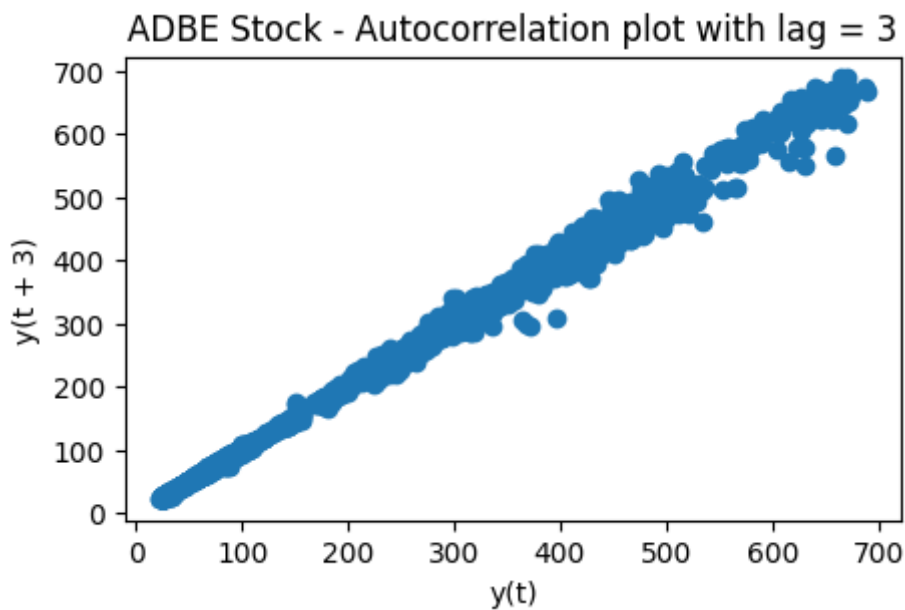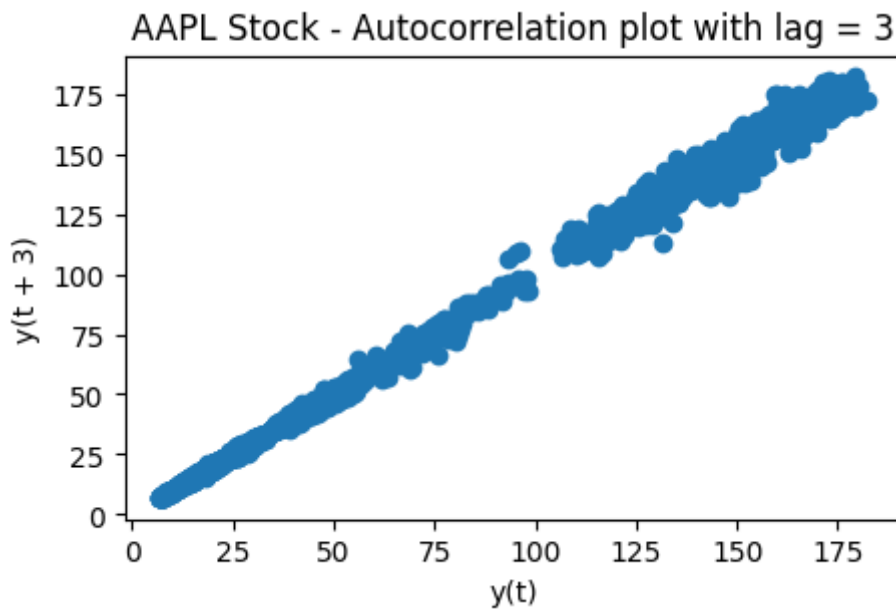
ORCL Stock - Autocorrelation plot with lag = 3

AMZN Stock - Autocorrelation plot with lag = 3

INTC Stock - Autocorrelation plot with lag = 3

MSFT Stock - Autocorrelation plot with lag = 3

NVDA Stock - Autocorrelation plot with lag = 3
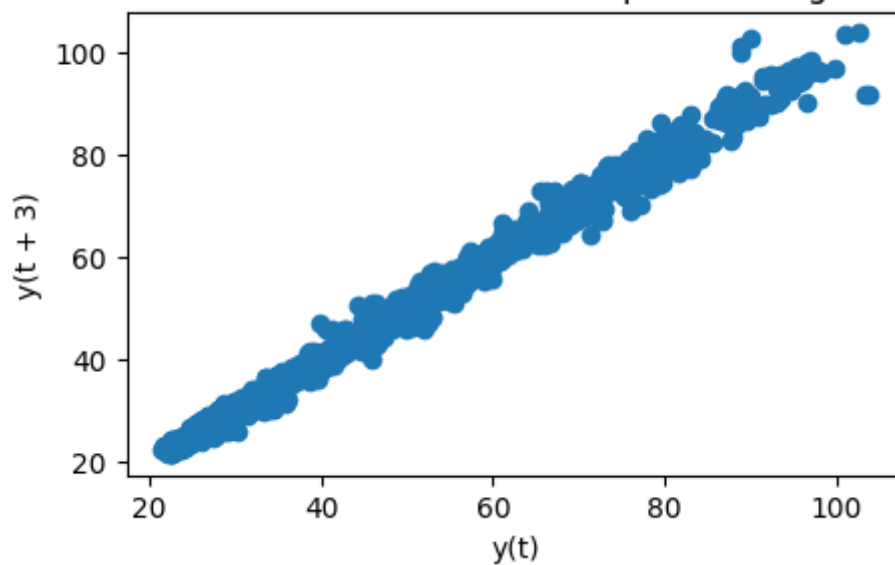
IBM Stock - Autocorrelation plot with lag = 3
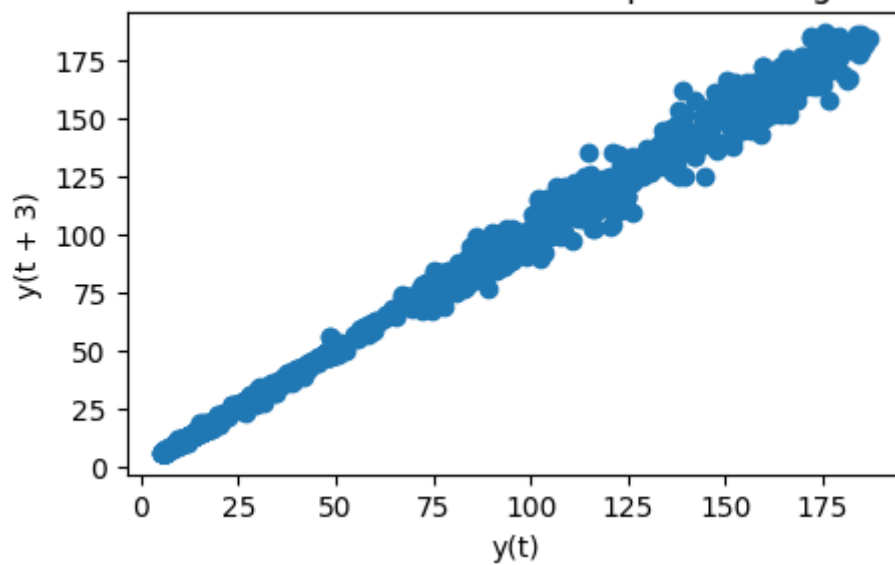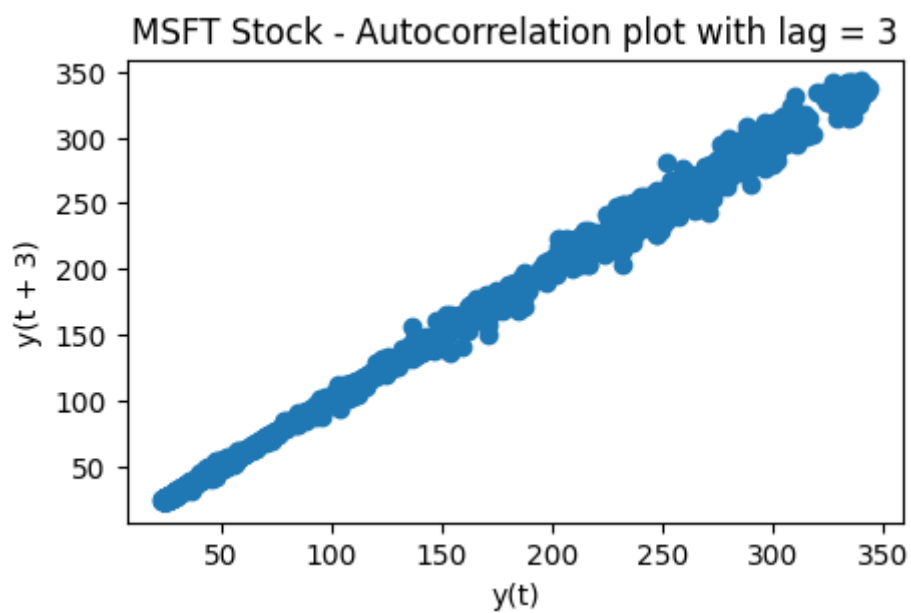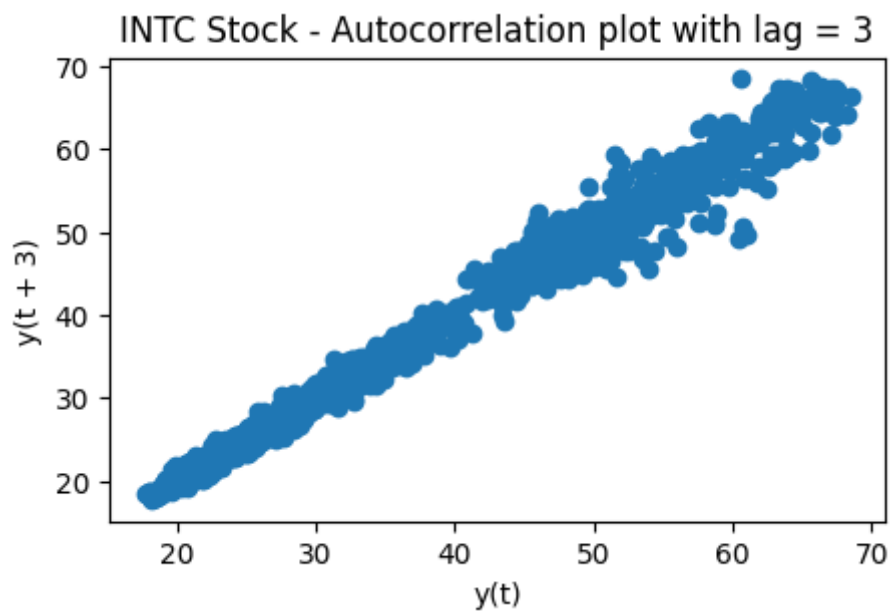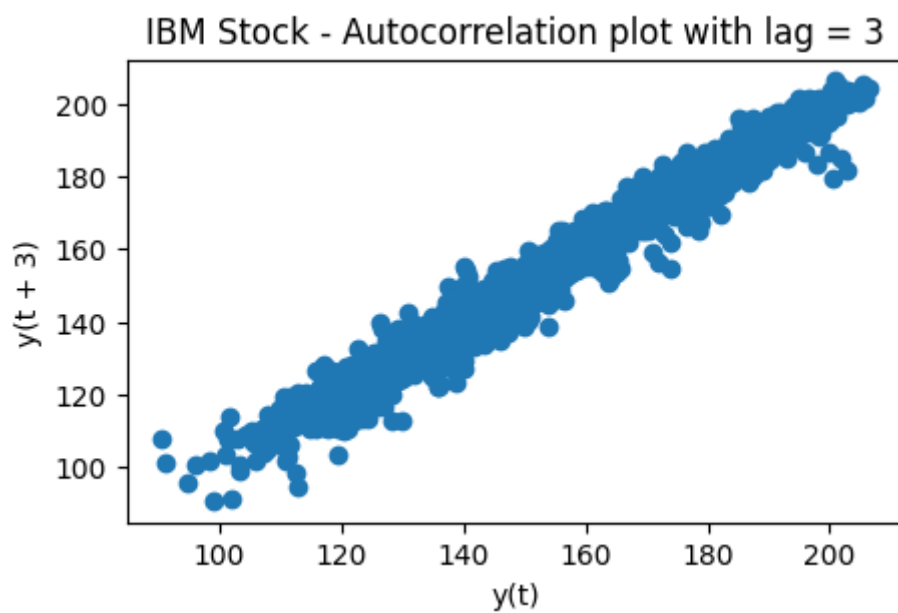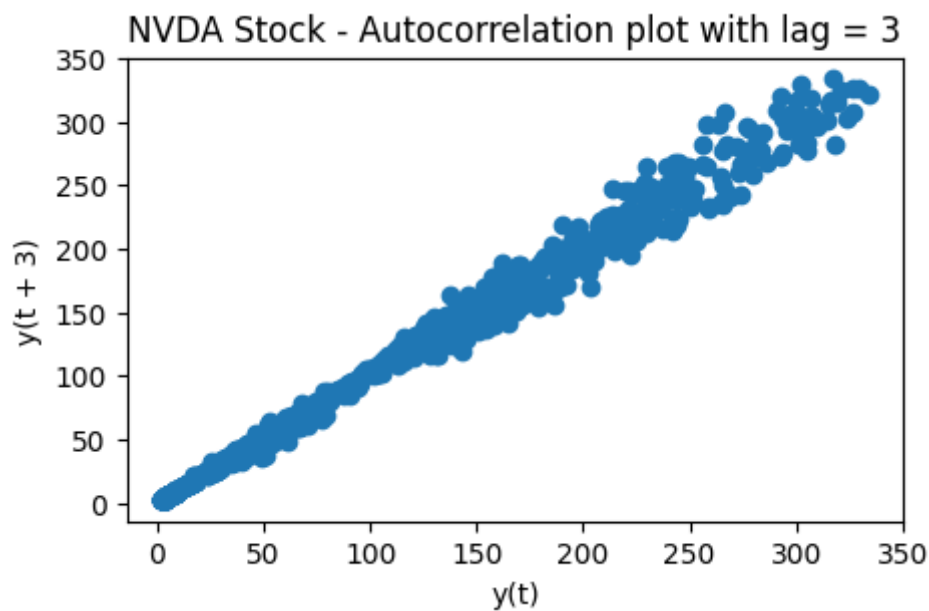
NFLX Stock - Autocorrelation plot with lag = 3
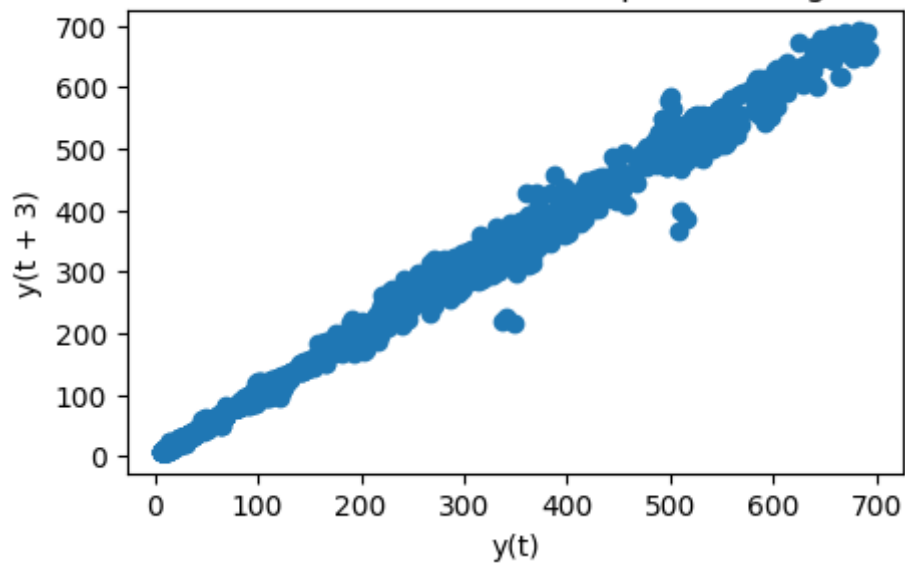
GOOGL Stock - Autocorrelation plot with lag = 3
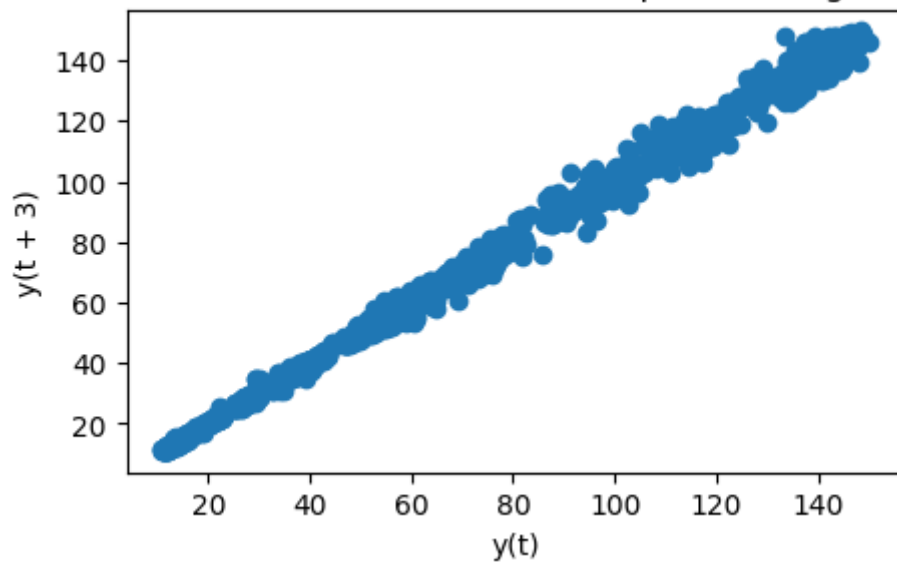
CRM Stock - Autocorrelation plot with lag = 3
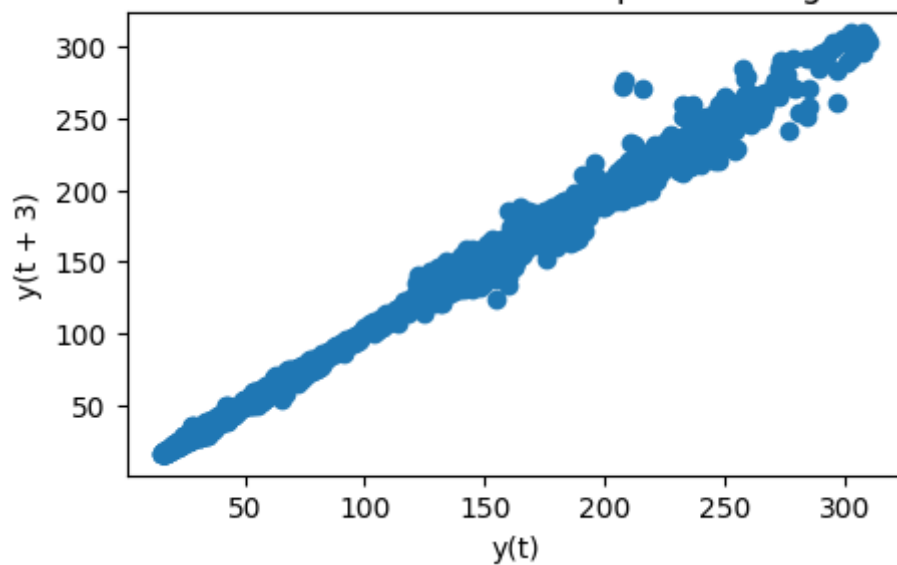
CSCO Stock - Autocorrelation plot with lag = 3
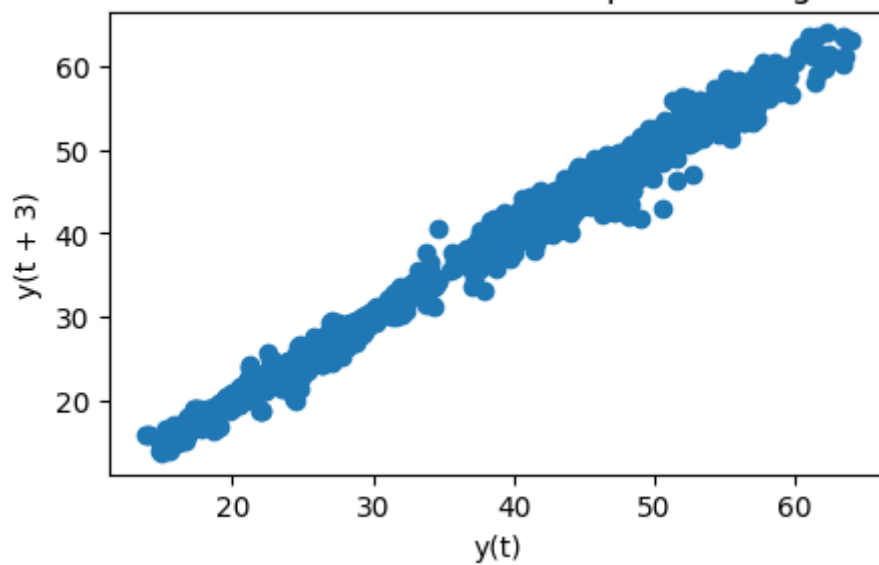
```
In [20]: for column in column_names:
             column_name = df[column].name
             plt.figure(figsize=(6,3))
             plt.plot(df.index, df[column_name])
             plt.xticks(np.arange(0,3254, 1000), df.index[0:3254:1000])
             plt.title(column_name)
             plt.xlabel("time")
             plt.ylabel("price")
             plt.show()
```

AAPL

ADBE

NFLX

GOOGL

CRM

CSCO
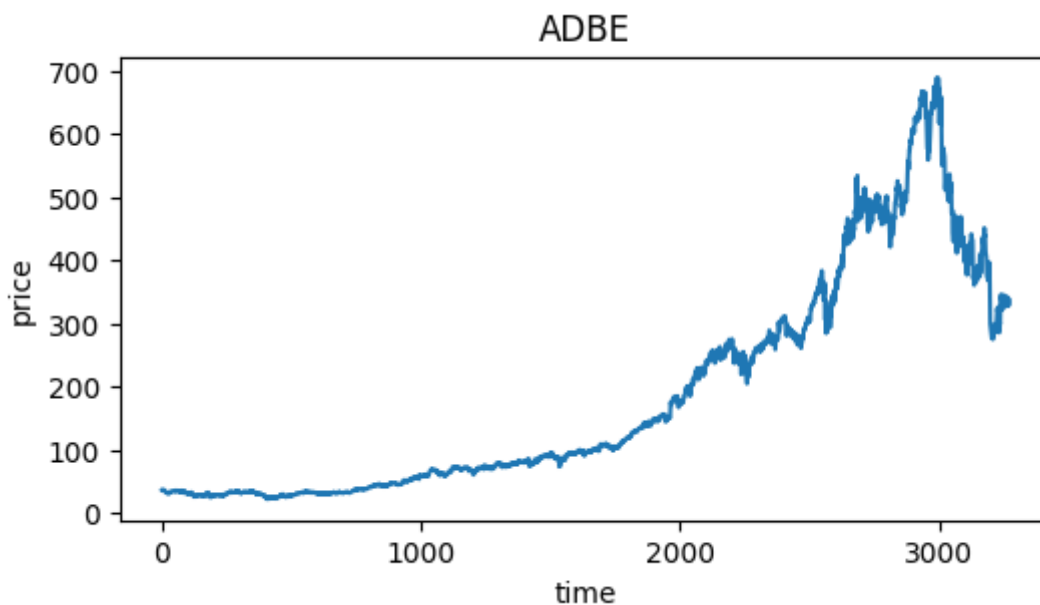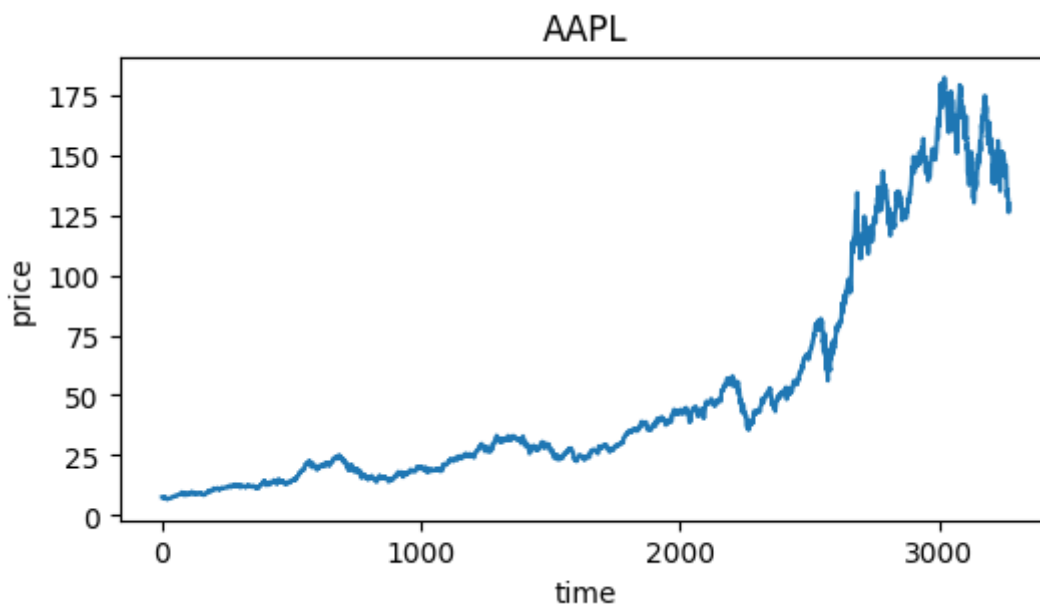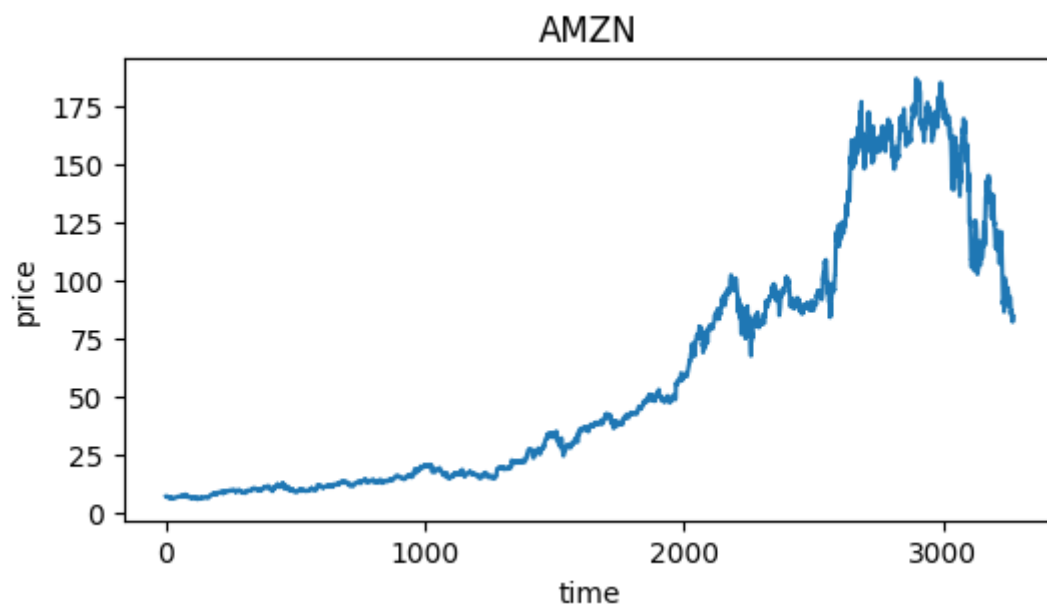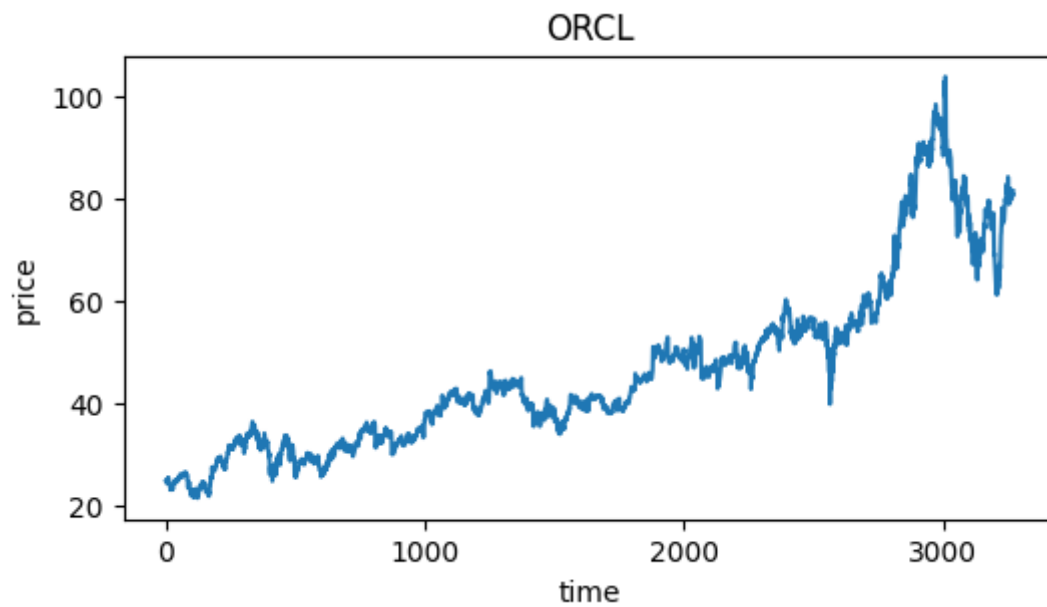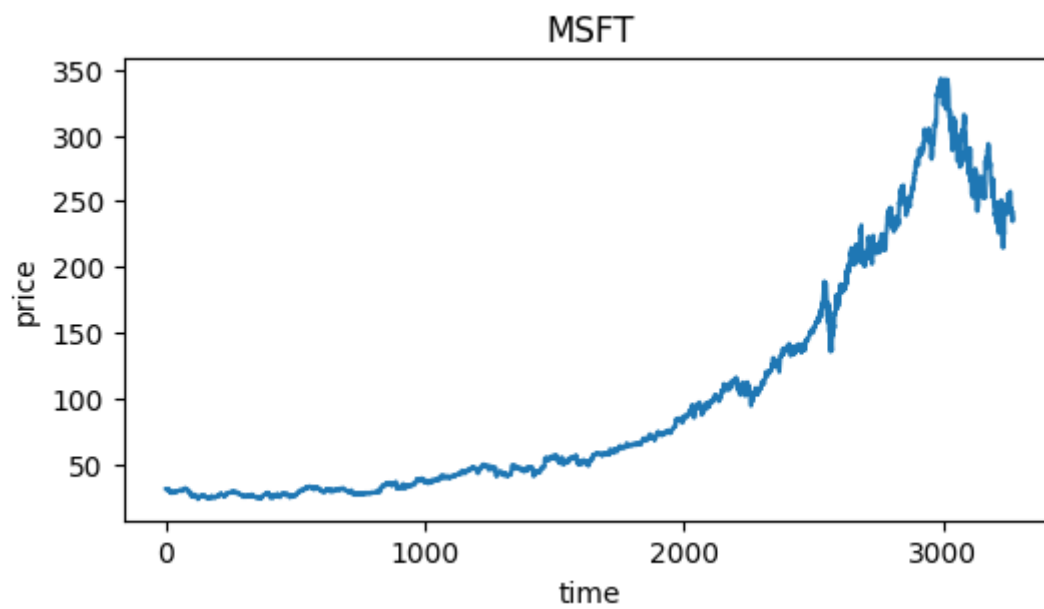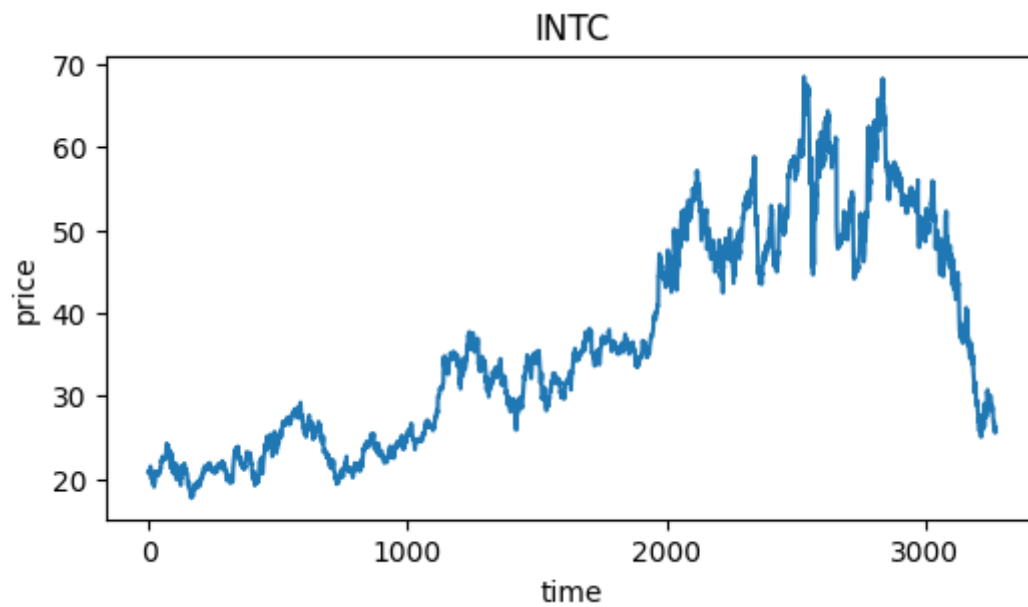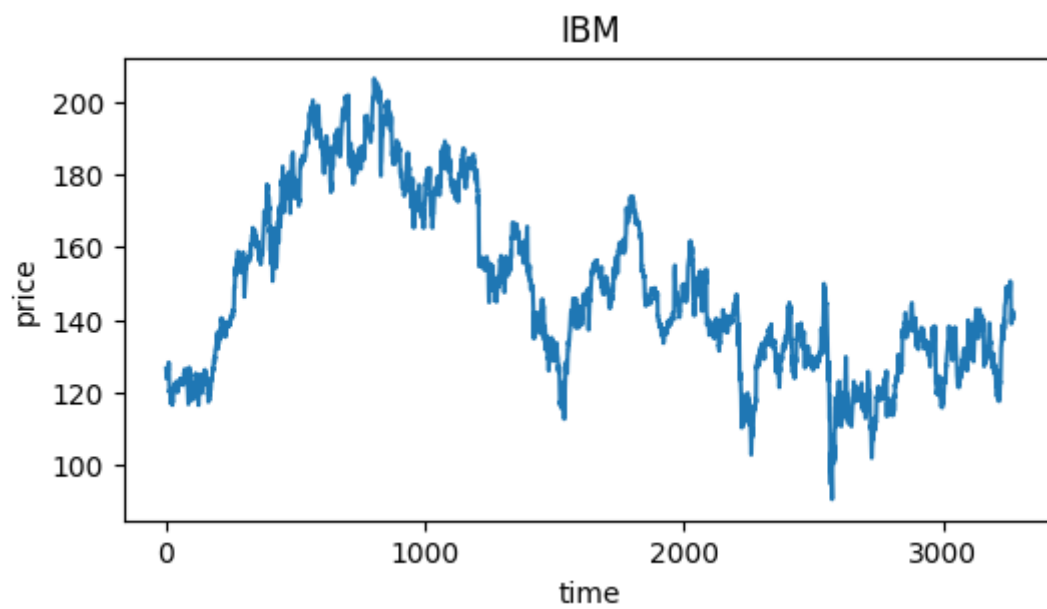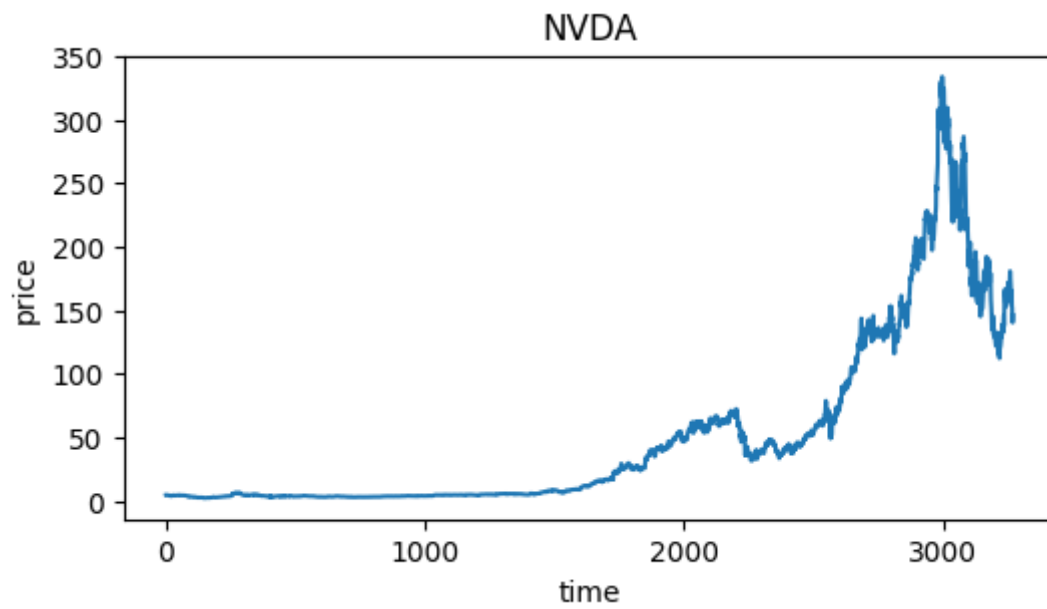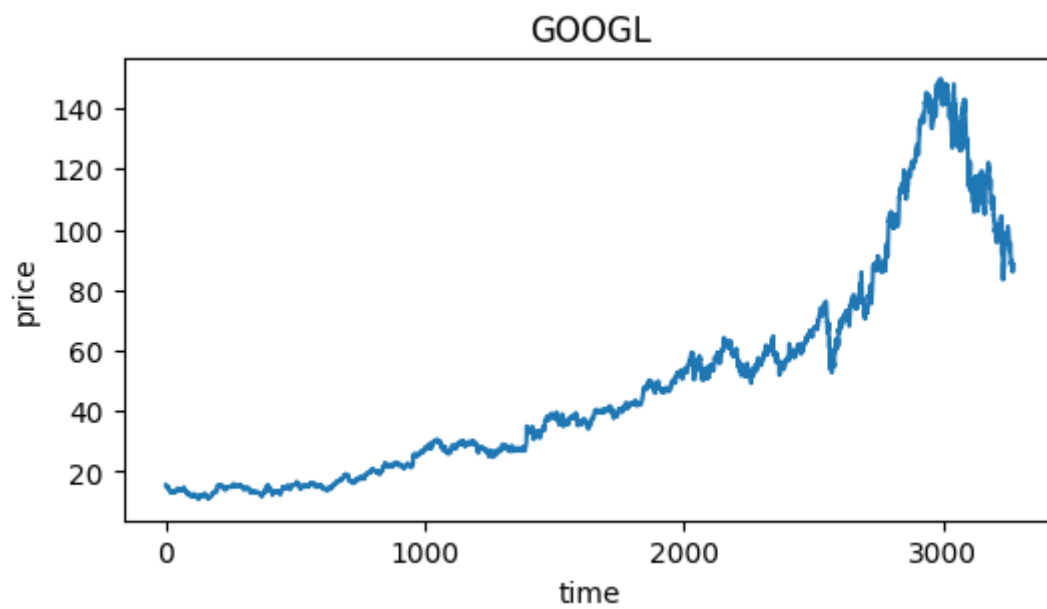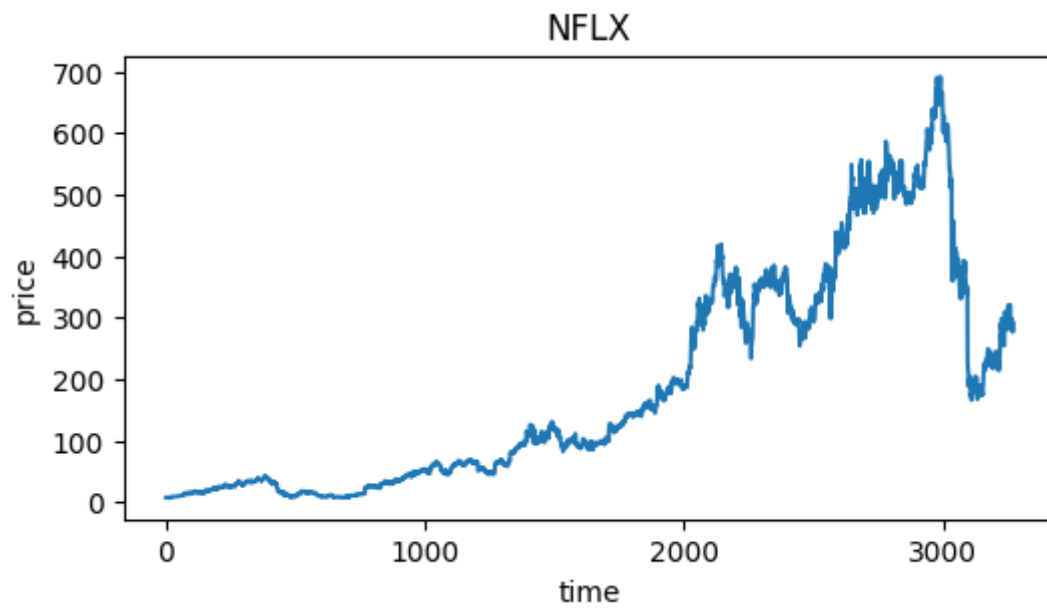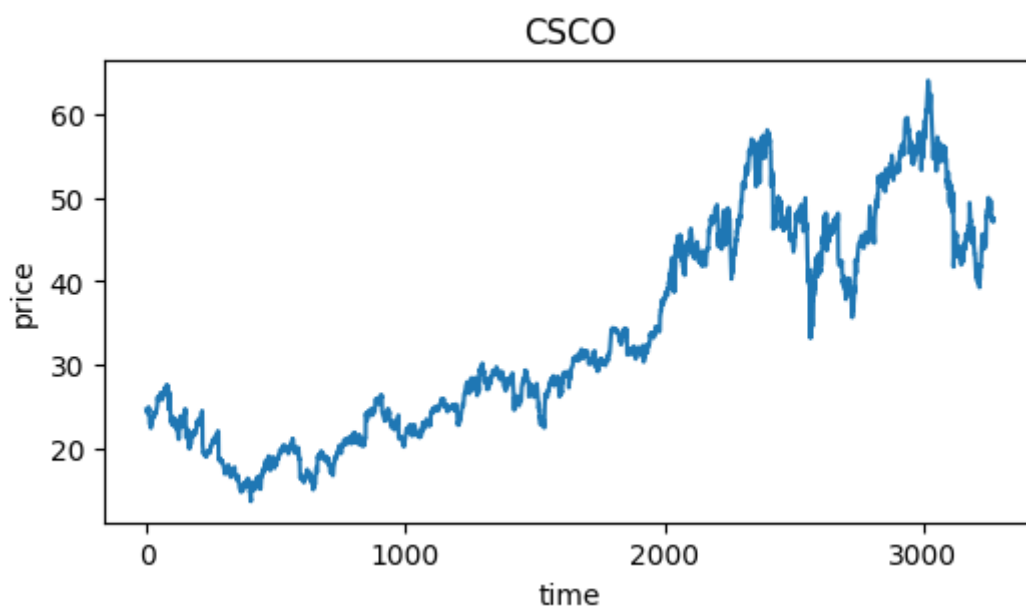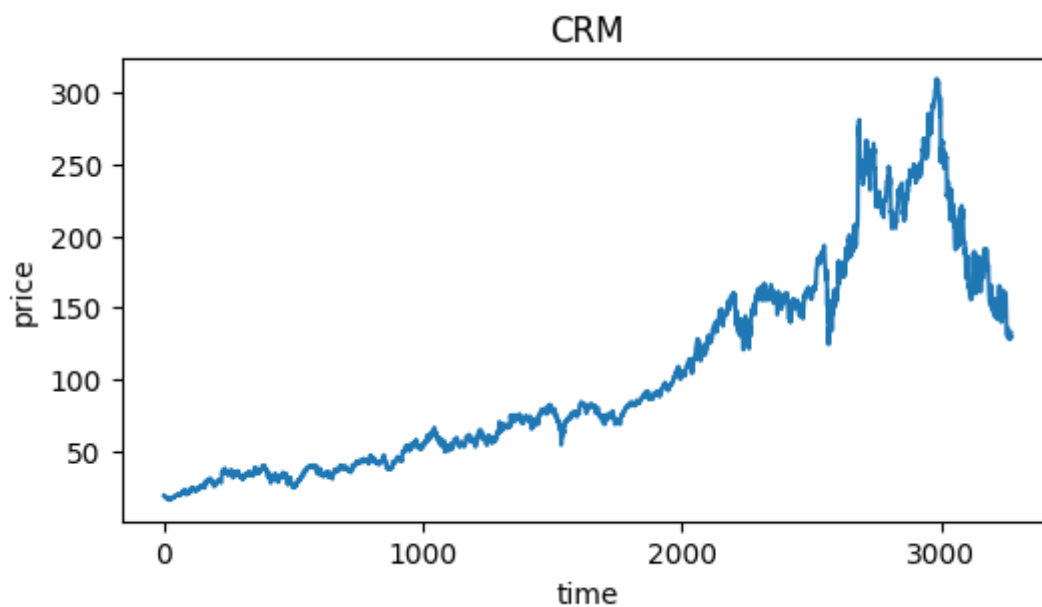
Statistical Testing

```python
In [21]: for column in column_names:

             fig = plt.figure(figsize =(10, 7))

             # Creating plot
             plt.boxplot(df[column])

             # show plot
             plt.show()
```
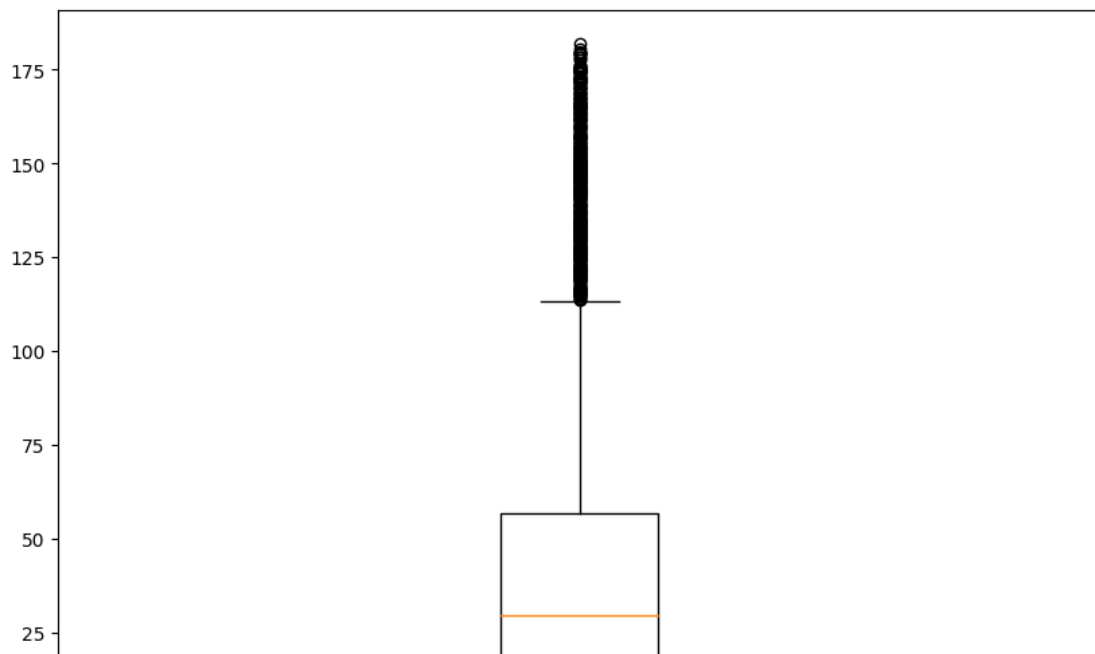
```python
In [22]: for column in column_names:
    fig = plt.figure(figsize =(10, 7))
    ax = fig.add_subplot(111)

    # Creating axes instance
    bp = ax.boxplot(df[column], patch_artist = True,
                    notch ='True', vert = 0)

    colors = ['#0000FF', '#00FF00',
              '#FFFF00', '#FF00FF']

    for patch, color in zip(bp['boxes'], colors):
        patch.set_facecolor(color)

    # changing color and linewidth of
    # whiskers
    for whisker in bp['whiskers']:
        whisker.set(color ='#8B008B',
                    linewidth = 1.5,
                    linestyle =":")

    # changing color and linewidth of
    # caps
    for cap in bp['caps']:
        cap.set(color ='#8B008B',
                linewidth = 2)

    # changing color and linewidth of
    # medians
    for median in bp['medians']:
        median.set(color ='red',
                   linewidth = 3)

    # changing style of fliers
    for flier in bp['fliers']:
        flier.set(marker ='D',
                  color ='#e7298a',
                  alpha = 0.5)

    # x-axis labels
    ax.set_yticklabels([column])

    # Adding title
    plt.title("Customized box plot")

    # Removing top axes and right axes
    # ticks
    ax.get_xaxis().tick_bottom()
    ax.get_yaxis().tick_left()

    # show plot
    plt.show()
```
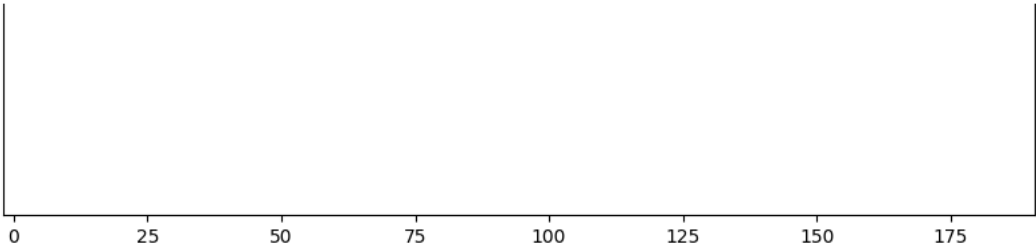
Customized box plot
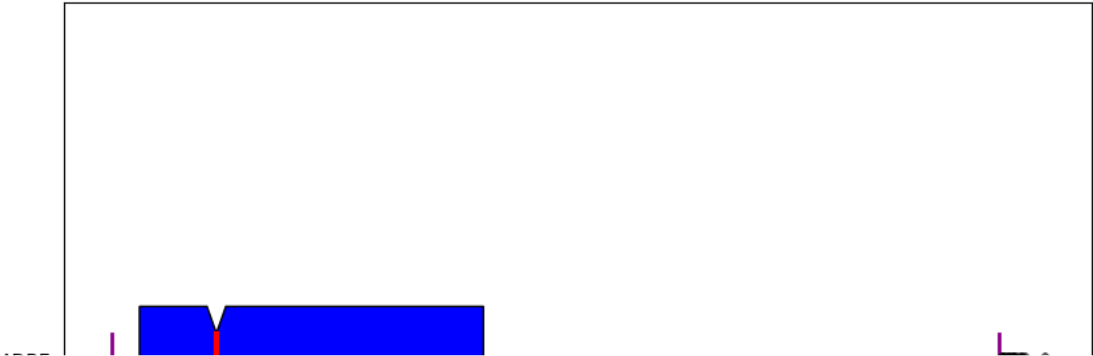
```python
for column in column_names:
    result = adfuller(df[column])
    print(column, "adfuller results")
    print("*******************************************")
    print(f'ADF Statistic: {result[0]}')
    print(f'n_lags: {result[1]}')
    print(f'p-value: {result[1]}')
    for key, value in result[4].items():
        print('Critial Values:')
        print(f'   {key}, {value}')
    print("*******************************************")
```

```
AAPL adfuller results
**********************************************
ADF Statistic: -0.292133126997203
n_lags: 0.9266111504966588
p-value: 0.9266111504966588
Critial Values:
    1%, -3.4323649247638532
Critial Values:
    5%, -2.862430273204085
Critial Values:
    10%, -2.5672439115886396
**********************************************
ADBE adfuller results
**********************************************
ADF Statistic: -0.9251077965634471
n_lags: 0.7795916617197637
p-value: 0.7795916617197637
Critial Values:
    1%, -3.4323612065383737
Critial Values:
    5%, -2.8624286309001996
Critial Values:
    10%, -2.5672430372603676
**********************************************
ORCL adfuller results
**********************************************
ADF Statistic: -0.6006823188169339
n_lags: 0.8708277762279395
p-value: 0.8708277762279395
Critial Values:
    1%, -3.432357502010421
Critial Values:
    5%, -2.862426994644342
Critial Values:
    10%, -2.567242166152283
**********************************************
AMZN adfuller results
**********************************************
ADF Statistic: -1.0107410989872103
n_lags: 0.7493266001827674
p-value: 0.7493266001827674
Critial Values:
    1%, -3.432368033803368
Critial Values:
    5%, -2.8624316464349073
Critial Values:
    10%, -2.5672446426683
**********************************************
INTC adfuller results
**********************************************
ADF Statistic: -1.7547064254734381
n_lags: 0.4031690396282374
p-value: 0.4031690396282374
Critial Values:
    1%, -3.4323568859154863
Critial Values:
    5%, -2.86242672252069
```

```
Critial Values:
    10%, -2.567242021279427
**********************************************
MSFT adfuller results
**********************************************
ADF Statistic: 0.18121489327494875
n_lags: 0.9711880934792432
p-value: 0.9711880934792432
Critial Values:
    1%, -3.4323605881678785
Critial Values:
    5%, -2.8624283577717917
Critial Values:
    10%, -2.567242891852544
**********************************************
NVDA adfuller results
**********************************************
ADF Statistic: -0.801207723408756
n_lags: 0.8187670505723177
p-value: 0.8187670505723177
Critial Values:
    1%, -3.4323692801073022
Critial Values:
    5%, -2.862432196914153
Critial Values:
    10%, -2.5672449357321216
**********************************************
IBM adfuller results
**********************************************
ADF Statistic: -2.069390871190091
n_lags: 0.25699942627782446
p-value: 0.25699942627782446
Critial Values:
    1%, -3.4323667890369283
Critial Values:
    5%, -2.862431096634527
Critial Values:
    10%, -2.5672443499659305
**********************************************
NFLX adfuller results
**********************************************
ADF Statistic: -1.2516068791343127
n_lags: 0.651011447780957
p-value: 0.651011447780957
Critial Values:
    1%, -3.4323649247638532
Critial Values:
    5%, -2.862430273204085
Critial Values:
    10%, -2.5672439115886396
**********************************************
GOOGL adfuller results
**********************************************
ADF Statistic: -0.6299376180176419
n_lags: 0.8640728610433623
p-value: 0.8640728610433623
Critial Values:
```

```
            1%, -3.4323649247638532
        Critial Values:
            5%, -2.862430273204085
        Critial Values:
            10%, -2.5672439115886396
        *******************************************
        CRM adfuller results
        *******************************************
        ADF Statistic: -1.3205708951038662
        n_lags: 0.6197093500735752
        p-value: 0.6197093500735752
        Critial Values:
            1%, -3.4323605881678785
        Critial Values:
            5%, -2.8624283577717917
        Critial Values:
            10%, -2.567242891852544
        *******************************************
        CSCO adfuller results
        *******************************************
        ADF Statistic: -1.0560890706136616
        n_lags: 0.7322618329737813
        p-value: 0.7322618329737813
        Critial Values:
            1%, -3.4323649247638532
        Critial Values:
            5%, -2.862430273204085
        Critial Values:
            10%, -2.5672439115886396
        *******************************************
```

In [24]:
```python
# Earliest date index location
print('Earliest date index location is: ',df.index.argmin())

# Latest date location
print('Latest date location: ',df.index.argmax())
```

```
Earliest date index location is:  0
Latest date location:  3270
```

```
In [25]:  # Visualising the VWAP
          plt.figure(figsize=(16,8))
          plt.plot(df[['AAPL', 'ADBE', 'ORCL', 'AMZN', 'INTC', 'MSFT', 'NVDA', 'I
              'GOOGL', 'CRM', 'CSCO']], label=['AAPL', 'ADBE', 'ORCL', 'AMZN', 'I
                  'GOOGL', 'CRM', 'CSCO'])
          plt.title('Time Series')
          plt.xlabel("Time(year)")
          plt.ylabel("Volume Weighted Average Price")
          plt.legend(loc='best')
```

Out[25]: <matplotlib.legend.Legend at 0x155099e80>
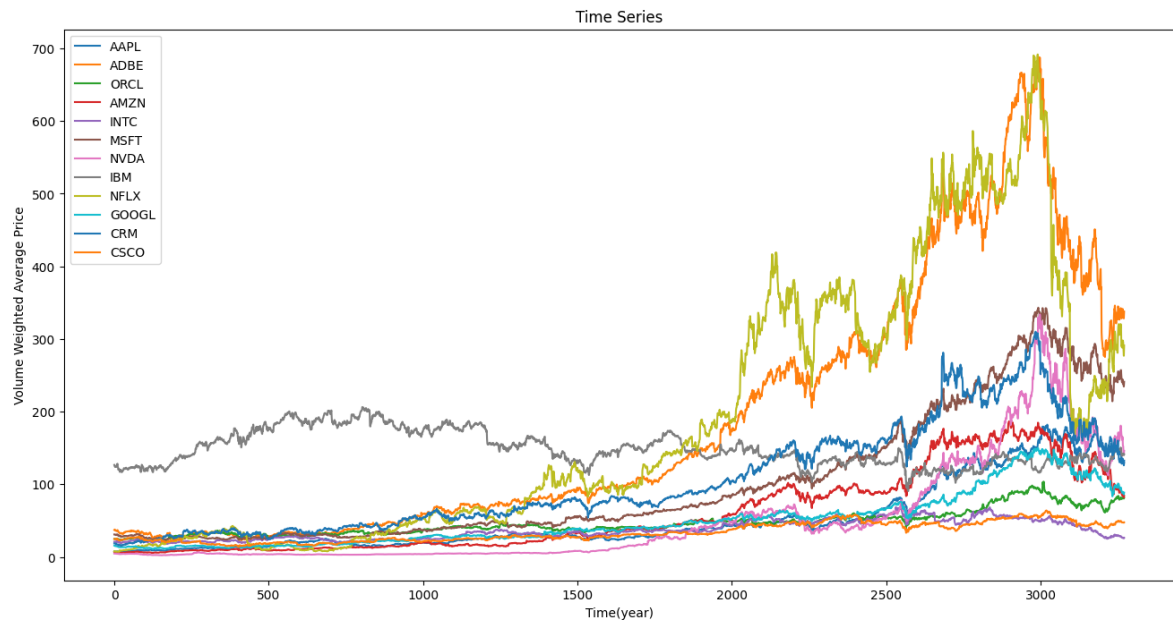
```python
In [26]: for column in column_names:
             column_name = df[column].name

             train_data, test_data = df[column_name][0:int(len(df[column_name])*(
             plt.figure(figsize=(6,3))
             plt.title(column_name)
             plt.xlabel('Dates')
             plt.ylabel('Closing Price')
             plt.plot(df[column_name], 'blue', label='Training Data')
             plt.plot(test_data[column_name], 'green', label='Testing Data')
             plt.xticks(np.arange(0,3254, 1000), df.index[0:3254:1000])
             plt.legend()
```

ORCL

AMZN

NFLX

GOOGL
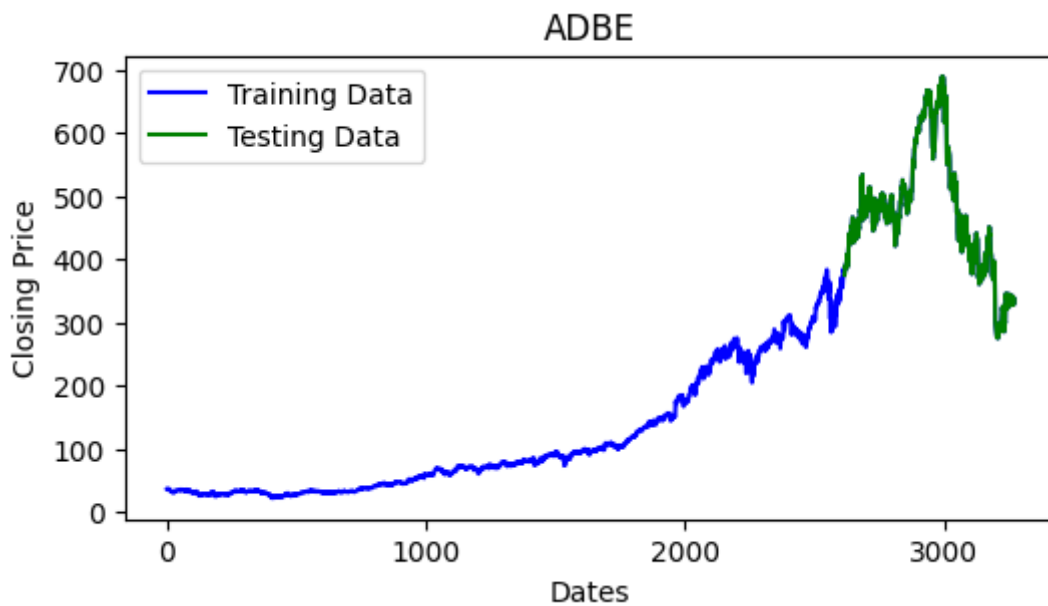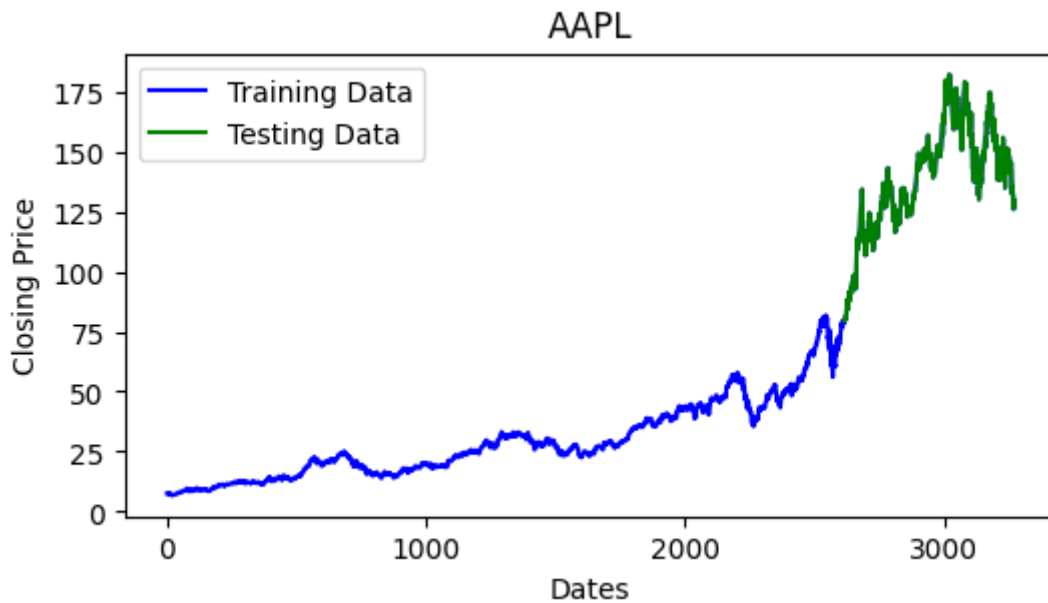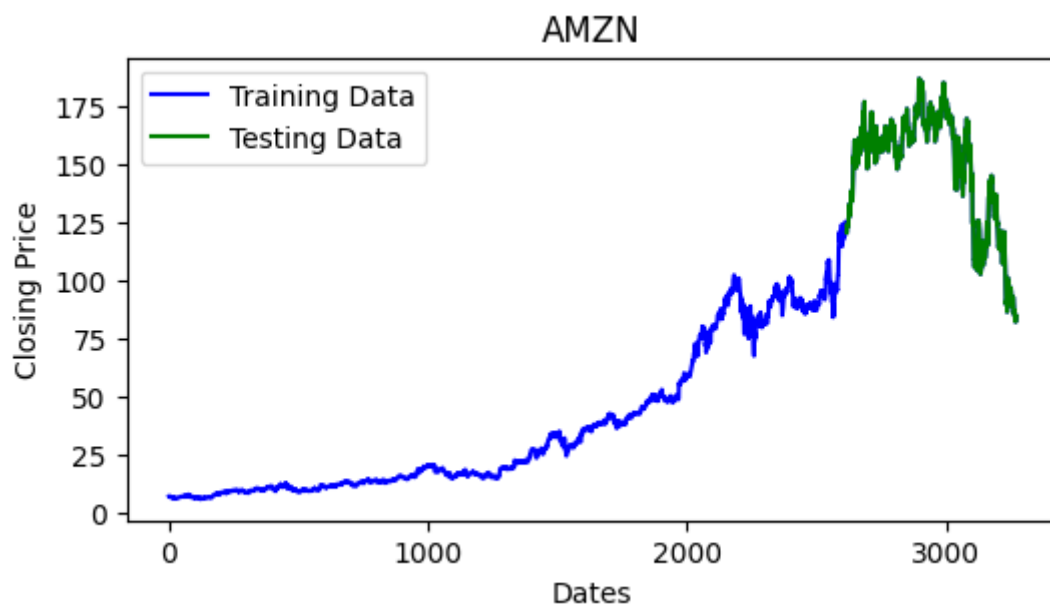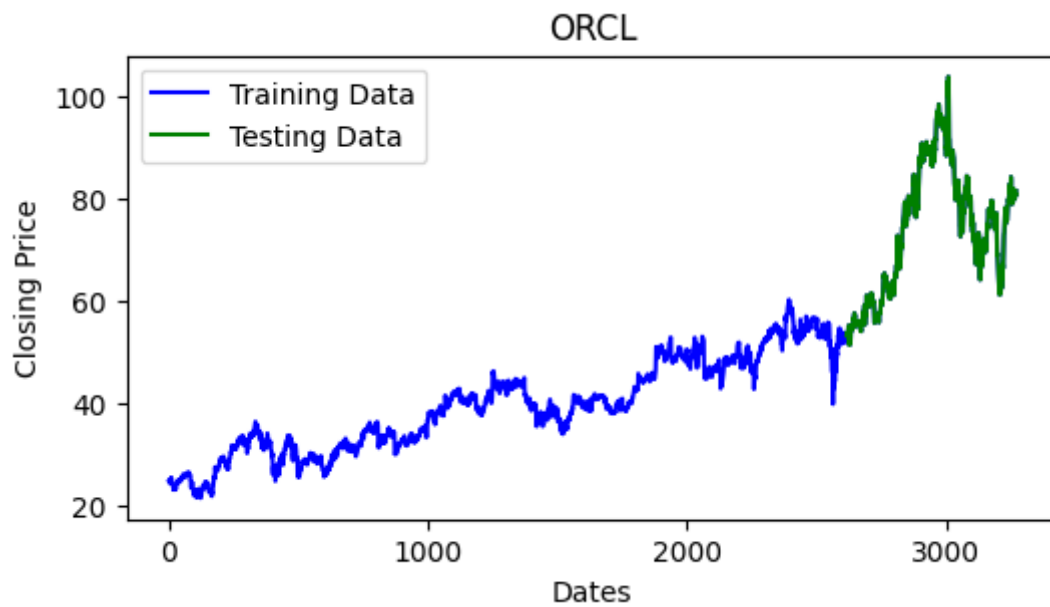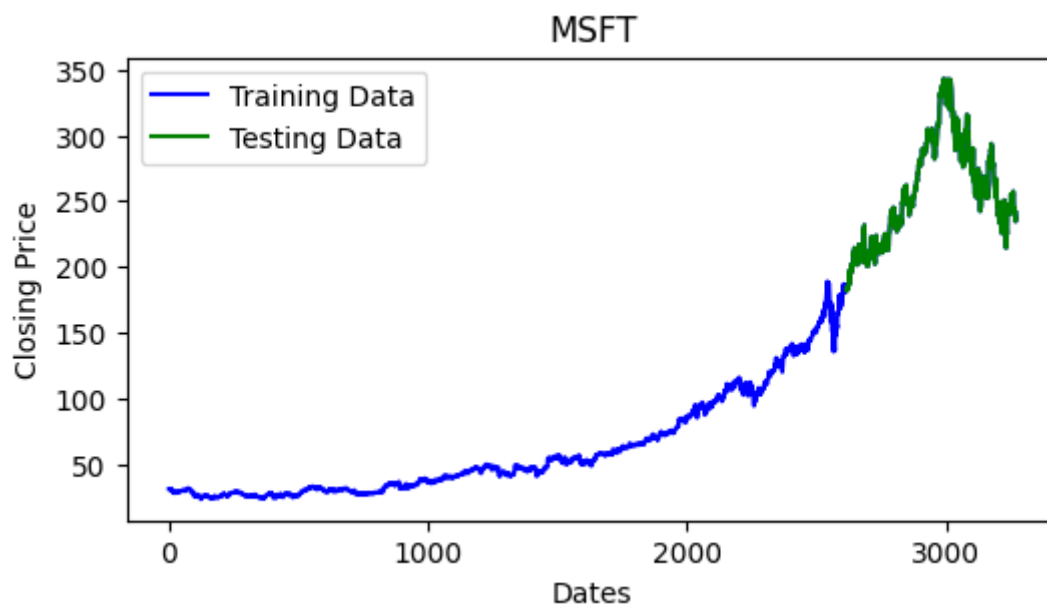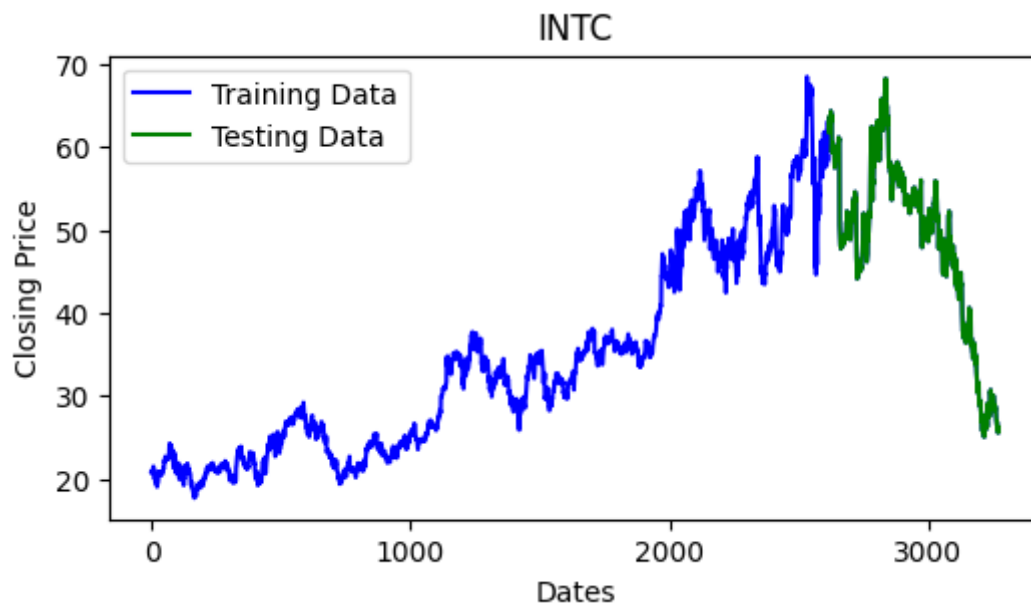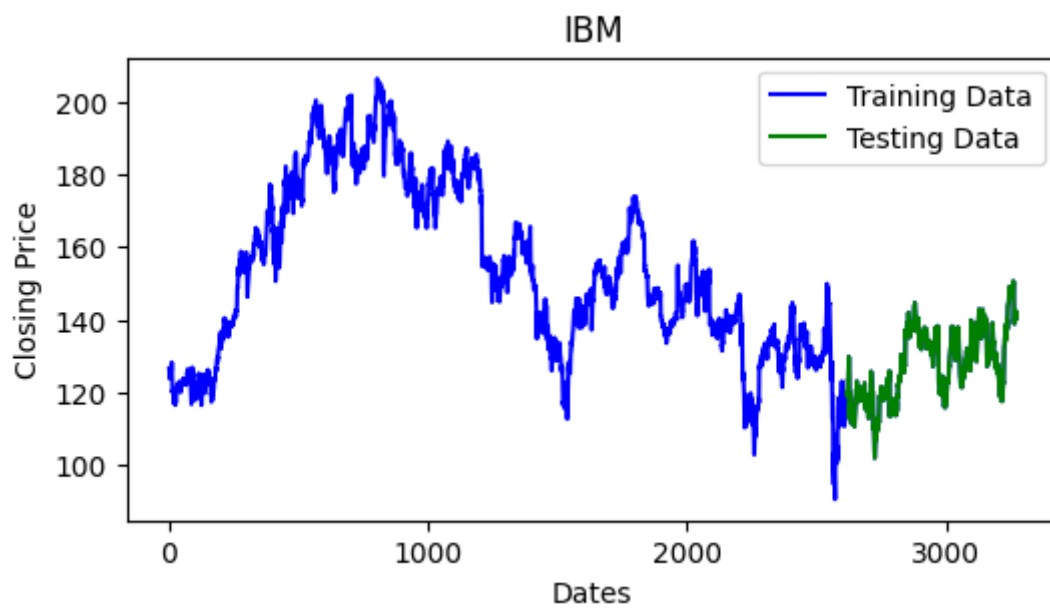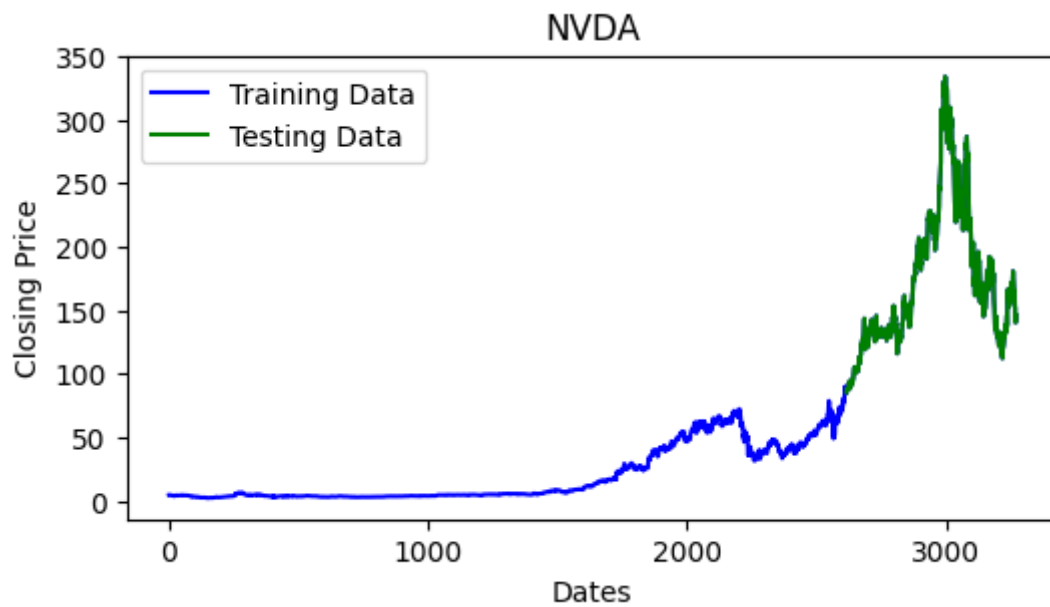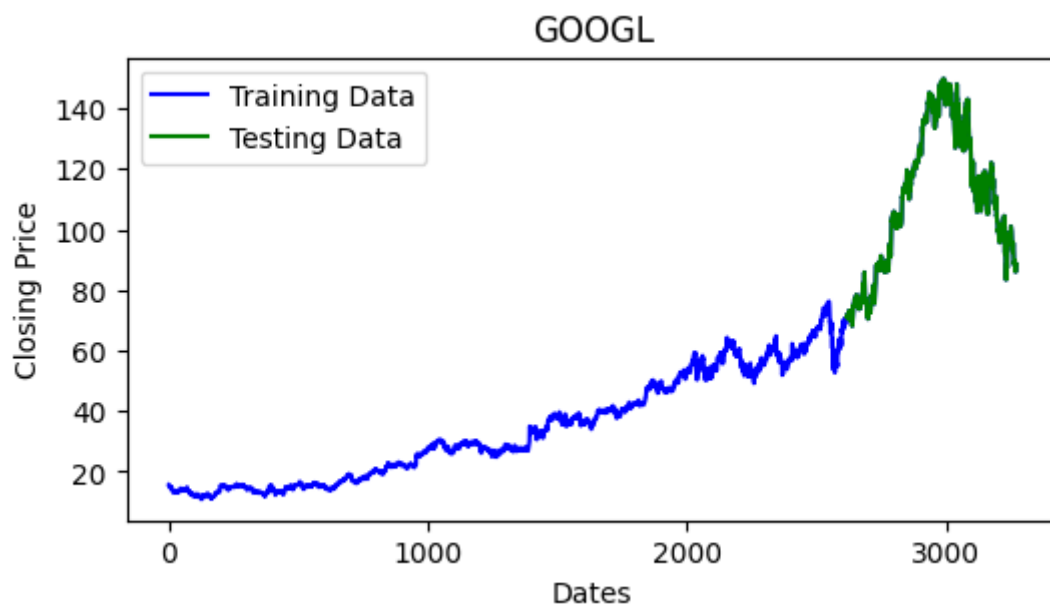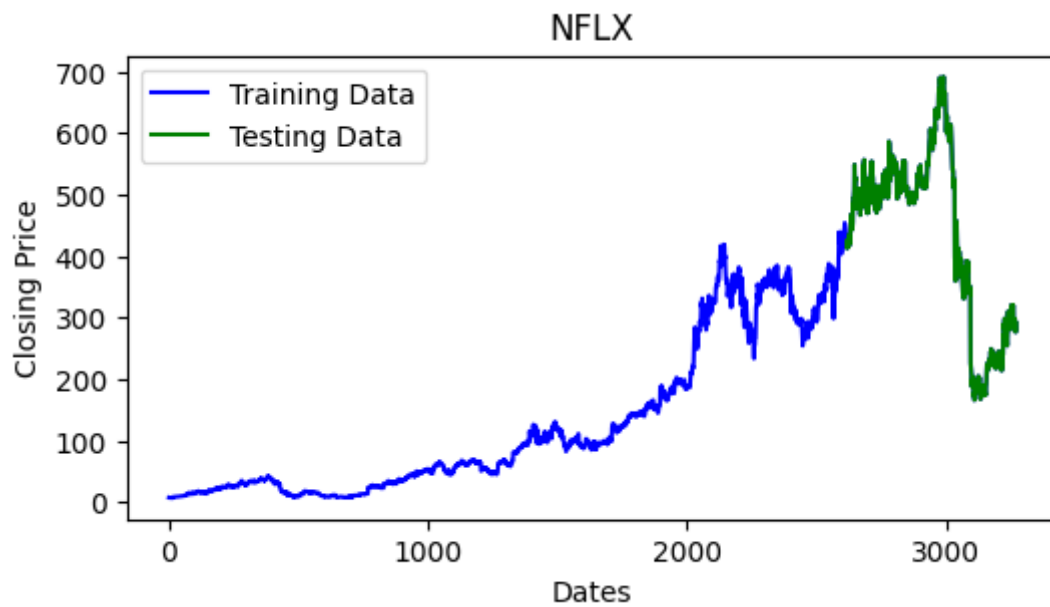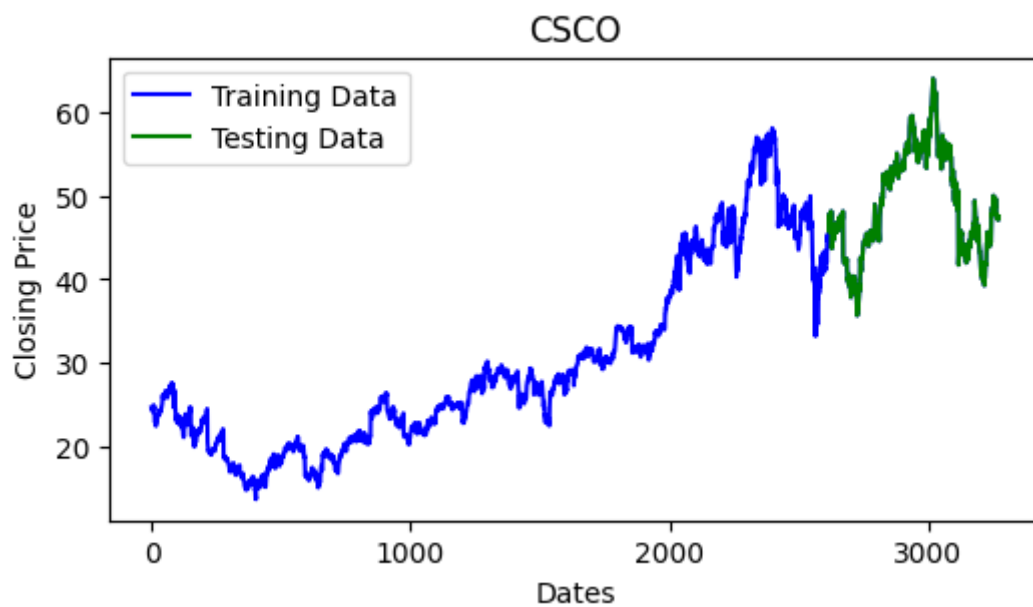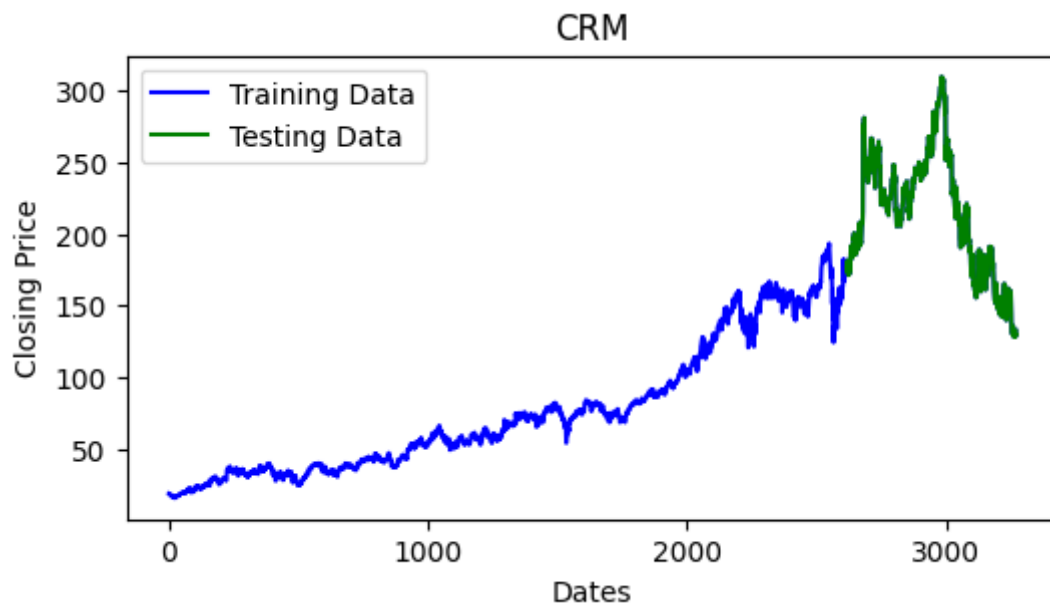
```
In [27]: corr = df.corr()
         plt.figure(figsize=(9,6))
         sns.heatmap(corr, annot=True)
```

Out[27]: <AxesSubplot: >
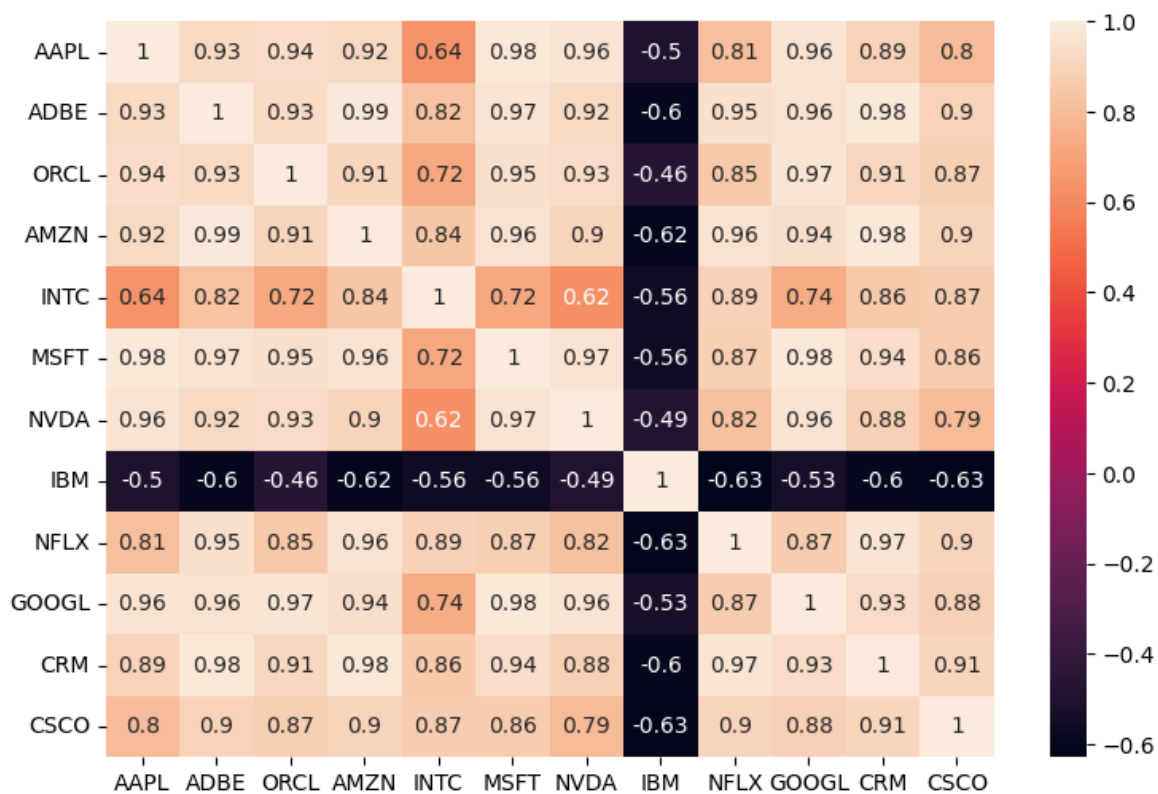
Creation of Time Series Model

Utilizing auto ARIMA by conducting differencing tests to determine the order of differencing

This step also includes creating and fitting ARIMA model

In [28]:
```python
aa = pd.DataFrame()
aa.index = ['p', 'q', 'd']

future_forecast = pd.DataFrame()

for column in column_names:
    column_name = df[column].name

    train_data, test_data = df[column_name][0:int(len(df[column_name])*(
    print("************************************************************
    print("AUTO ARIMA FOR ", column_name)
    print("************************************************************
    model_autoARIMA = auto_arima(train_data, start_p=0, start_q=0,
                          test='adf',
                          max_p=3, max_q=3,
                          m=12,
                          d=None,
                          seasonal=False,
                          start_P=0,
                          D=0,
                          trace=True,
                          error_action='ignore',
                          suppress_warnings=True,
                          stepwise=True)
    print(model_autoARIMA.summary())
    aa[column_name] = model_autoARIMA.get_params().get("order")
    model_autoARIMA.plot_diagnostics(figsize=(15,8))
    plt.show()

    model_autoARIMA.fit(train_data)

    future_forecast[column_name] = model_autoARIMA.predict(n_periods=37
```

```
*********************************************************************
AUTO ARIMA FOR  AAPL
*********************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=5341.570, Time=0.10 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=5260.299, Time=0.09 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=5265.993, Time=0.26 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=5343.908, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=5261.181, Time=0.06 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=5261.330, Time=0.16 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=5256.303, Time=0.77 sec
 ARIMA(3,1,1)(0,0,0)[0] intercept   : AIC=5205.500, Time=0.75 sec
 ARIMA(3,1,0)(0,0,0)[0] intercept   : AIC=5262.899, Time=0.28 sec
 ARIMA(3,1,2)(0,0,0)[0] intercept   : AIC=5213.870, Time=1.05 sec
 ARIMA(2,1,2)(0,0,0)[0] intercept   : AIC=5264.984, Time=0.43 sec
 ARIMA(3,1,1)(0,0,0)[0]             : AIC=5208.979, Time=0.46 sec

Best model:  ARIMA(3,1,1)(0,0,0)[0] intercept
Total fit time: 4.502 seconds
                          SARIMAX Results
================================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:               SARIMAX(3, 1, 1)   Log Likelihood
-2596.750
Date:                Sun, 19 Mar 2023   AIC
5205.500
Time:                        12:13:47   BIC
5240.714
Sample:                             0   HQIC
5218.255
                              - 2616
Covariance Type:                  opg
================================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
--------------------------------------------------------------------------
---------
intercept      0.0568      0.027      2.139      0.032       0.005
0.109
ar.L1         -1.0499      0.015    -71.460      0.000      -1.079
-1.021
ar.L2         -0.1190      0.011    -10.460      0.000      -0.141
-0.097
ar.L3          0.0887      0.007     12.538      0.000       0.075
0.103
ma.L1          0.8954      0.013     69.251      0.000       0.870
0.921
sigma2         0.4266      0.004    117.931      0.000       0.420
0.434
================================================================================
==============
Ljung-Box (L1) (Q):                   0.10   Jarque-Bera (JB):
65548.78
Prob(Q):                              0.76   Prob(JB):
```

```
0.00
Heteroskedasticity (H):              12.17    Skew:
-0.67
Prob(H) (two-sided):                  0.00    Kurtosis:
27.49
======================================================================
==============
```

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
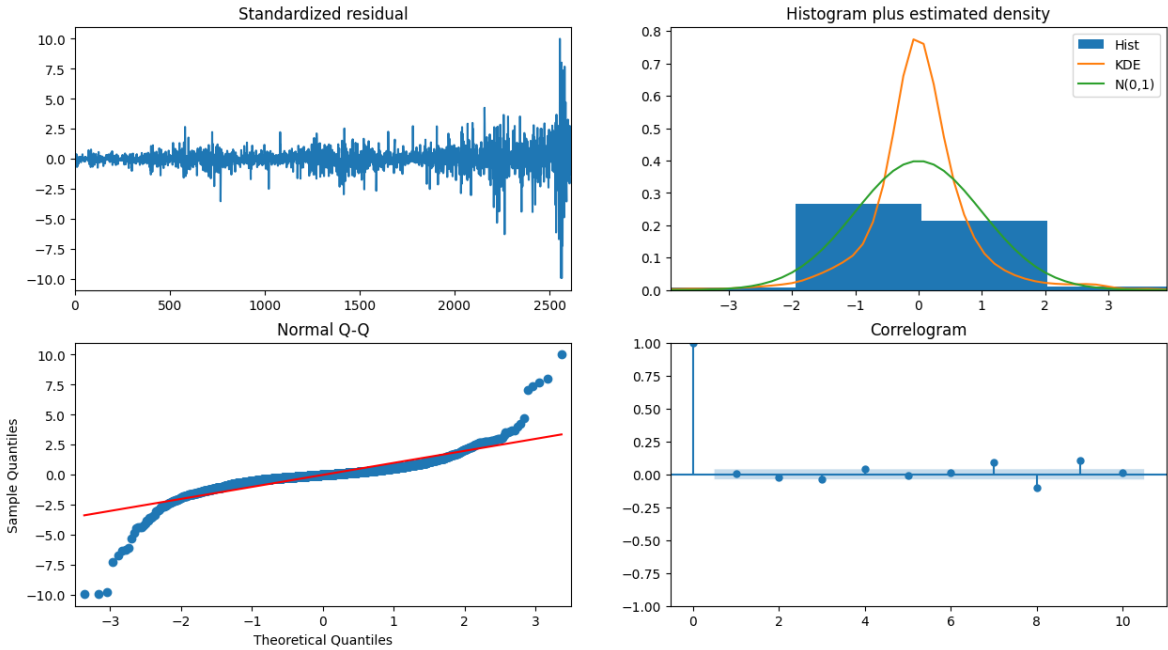
```
******************************************************************
AUTO ARIMA FOR  ADBE
******************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=13761.453, Time=0.05 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=13460.269, Time=0.13 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=13491.050, Time=0.12 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=13763.359, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=13462.124, Time=0.06 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=13462.162, Time=0.09 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=13464.267, Time=0.39 sec
 ARIMA(1,1,0)(0,0,0)[0]             : AIC=13466.115, Time=0.02 sec

Best model:  ARIMA(1,1,0)(0,0,0)[0] intercept
Total fit time: 0.929 seconds
                            SARIMAX Results
========================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:              SARIMAX(1, 1, 0)   Log Likelihood
-6727.134
Date:              Sun, 19 Mar 2023   AIC
13460.269
Time:                      12:13:49   BIC
13477.876
Sample:                           0   HQIC
13466.646
                              - 2616
Covariance Type:                opg
========================================================================
=========
                coef    std err          z      P>|z|      [0.025
0.975]
------------------------------------------------------------------------
---------
intercept      0.1739      0.063      2.744      0.006       0.050
0.298
ar.L1         -0.3312      0.004    -78.466      0.000      -0.340
-0.323
sigma2        10.0453      0.068    147.100      0.000       9.911
10.179
========================================================================
==============
Ljung-Box (L1) (Q):                  0.02   Jarque-Bera (JB):
134999.45
Prob(Q):                             0.89   Prob(JB):
0.00
Heteroskedasticity (H):             66.30   Skew:
-0.70
Prob(H) (two-sided):                 0.00   Kurtosis:
38.17
========================================================================
==============

Warnings:
```

[1] Covariance matrix calculated using the outer product of gradients (complex-step).
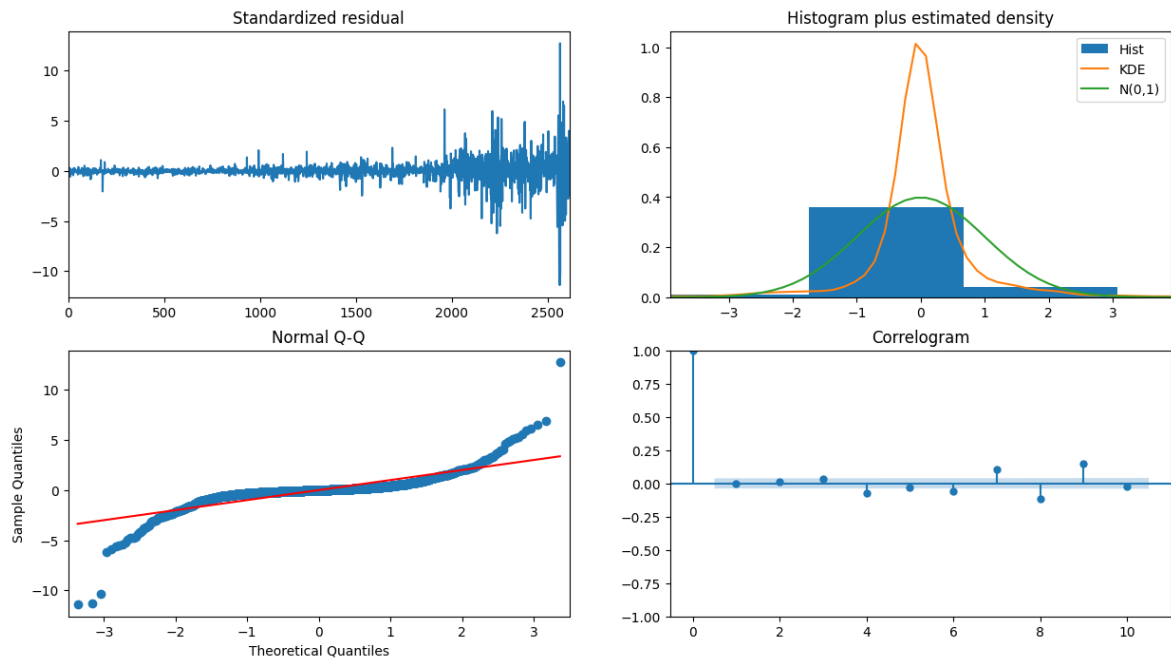
```
******************************************************************
AUTO ARIMA FOR  ORCL
******************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,0,0)(0,0,0)[0]                   : AIC=26778.972, Time=0.01 sec
 ARIMA(1,0,0)(0,0,0)[0]                   : AIC=inf, Time=0.19 sec
 ARIMA(0,0,1)(0,0,0)[0]                   : AIC=inf, Time=0.18 sec
 ARIMA(1,0,1)(0,0,0)[0]                   : AIC=5015.898, Time=0.15 sec
 ARIMA(2,0,1)(0,0,0)[0]                   : AIC=inf, Time=0.24 sec
 ARIMA(1,0,2)(0,0,0)[0]                   : AIC=5015.207, Time=0.42 sec
 ARIMA(0,0,2)(0,0,0)[0]                   : AIC=20073.900, Time=0.39 sec
 ARIMA(2,0,2)(0,0,0)[0]                   : AIC=inf, Time=0.49 sec
 ARIMA(1,0,3)(0,0,0)[0]                   : AIC=5017.198, Time=0.54 sec
 ARIMA(0,0,3)(0,0,0)[0]                   : AIC=17434.794, Time=0.56 sec
 ARIMA(2,0,3)(0,0,0)[0]                   : AIC=inf, Time=0.56 sec
 ARIMA(1,0,2)(0,0,0)[0] intercept        : AIC=5013.525, Time=0.34 sec
 ARIMA(0,0,2)(0,0,0)[0] intercept        : AIC=13085.308, Time=0.56 sec
 ARIMA(1,0,1)(0,0,0)[0] intercept        : AIC=5013.839, Time=0.24 sec
 ARIMA(2,0,2)(0,0,0)[0] intercept        : AIC=5015.421, Time=0.49 sec
 ARIMA(1,0,3)(0,0,0)[0] intercept        : AIC=5014.984, Time=0.67 sec
 ARIMA(0,0,1)(0,0,0)[0] intercept        : AIC=15547.184, Time=0.15 sec
 ARIMA(0,0,3)(0,0,0)[0] intercept        : AIC=11259.197, Time=0.62 sec
 ARIMA(2,0,1)(0,0,0)[0] intercept        : AIC=5013.562, Time=0.35 sec
 ARIMA(2,0,3)(0,0,0)[0] intercept        : AIC=4998.877, Time=1.14 sec
 ARIMA(3,0,3)(0,0,0)[0] intercept        : AIC=4967.282, Time=1.23 sec
 ARIMA(3,0,2)(0,0,0)[0] intercept        : AIC=4972.841, Time=1.11 sec
 ARIMA(3,0,3)(0,0,0)[0]                   : AIC=4967.891, Time=0.56 sec

Best model:  ARIMA(3,0,3)(0,0,0)[0] intercept
Total fit time: 11.214 seconds
                            SARIMAX Results
===============================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:              SARIMAX(3, 0, 3)   Log Likelihood
-2475.641
Date:              Sun, 19 Mar 2023   AIC
4967.282
Time:                      12:14:01   BIC
5014.237
Sample:                           0   HQIC
4984.290
                             - 2616
Covariance Type:                opg
===============================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
-------------------------------------------------------------------------------
---------
intercept      0.0565      0.201      0.282      0.778      -0.337
0.450
ar.L1         -0.7642      0.020    -37.893      0.000      -0.804
-0.725
ar.L2          0.8585      0.009     91.406      0.000       0.840
0.877
```

```
ar.L3            0.9042        0.021        42.078        0.000         0.862
0.946
ma.L1            1.6373        0.022        75.802        0.000         1.595
1.680
ma.L2            0.7113        0.022        32.020        0.000         0.668
0.755
ma.L3           -0.0612        0.011        -5.465        0.000        -0.083
-0.039
sigma2           0.3879        0.004        87.448        0.000         0.379
0.397
===============================================================================
==============
Ljung-Box (L1) (Q):                        0.02    Jarque-Bera (JB):
27668.72
Prob(Q):                                   0.90    Prob(JB):
0.00
Heteroskedasticity (H):                    2.46    Skew:
-0.15
Prob(H) (two-sided):                       0.00    Kurtosis:
18.93
===============================================================================
==============

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
```
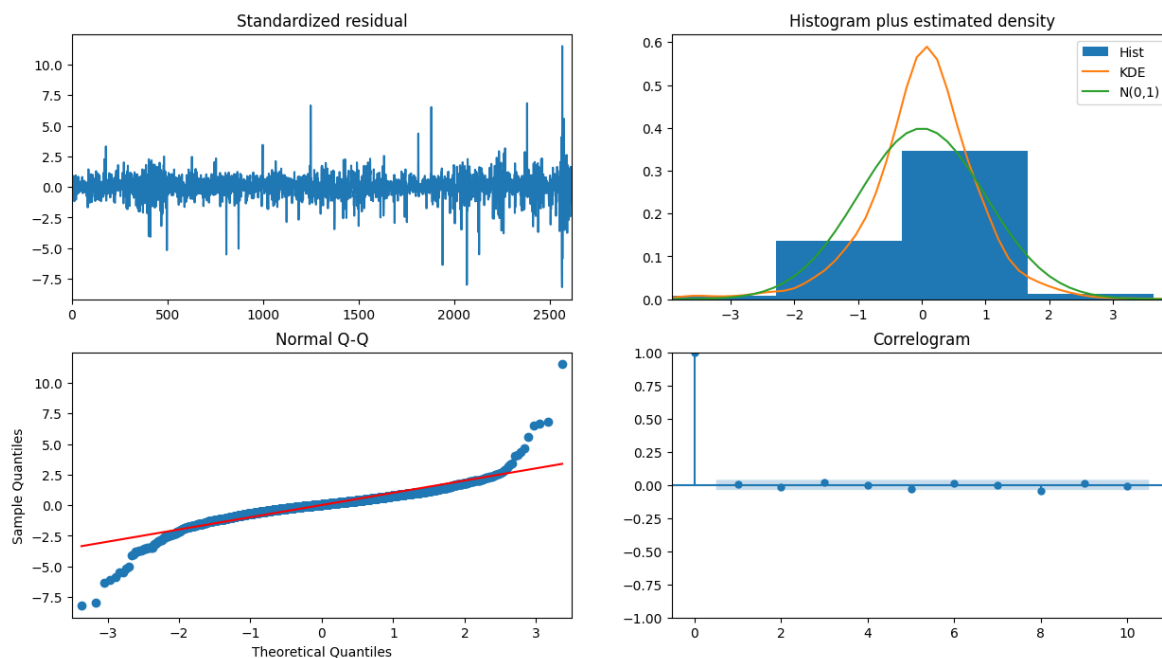
```
**************************************************************
AUTO ARIMA FOR  AMZN
**************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=7120.217, Time=0.18 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=7106.499, Time=0.09 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=7107.214, Time=0.06 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=7123.835, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=7107.458, Time=0.06 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=7107.792, Time=0.14 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=7108.497, Time=0.48 sec
 ARIMA(1,1,0)(0,0,0)[0]             : AIC=7111.049, Time=0.02 sec

Best model:  ARIMA(1,1,0)(0,0,0)[0] intercept
Total fit time: 1.069 seconds
                             SARIMAX Results
=======================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:              SARIMAX(1, 1, 0)   Log Likelihood
-3550.249
Date:                Sun, 19 Mar 2023   AIC
7106.499
Time:                         12:14:04   BIC
7124.106
Sample:                              0   HQIC
7112.876
                               - 2616
Covariance Type:                   opg
=======================================================================
=========
                 coef    std err         z      P>|z|      [0.025
0.975]
-----------------------------------------------------------------------
---------
intercept       0.0472     0.018      2.562      0.010       0.011
0.083
ar.L1          -0.0774     0.007    -11.126      0.000      -0.091
-0.064
sigma2          0.8846     0.008    110.774      0.000       0.869
0.900
=======================================================================
===============
Ljung-Box (L1) (Q):                   0.01   Jarque-Bera (JB):
32090.82
Prob(Q):                              0.94   Prob(JB):
0.00
Heteroskedasticity (H):              52.93   Skew:
-0.17
Prob(H) (two-sided):                  0.00   Kurtosis:
20.16
=======================================================================
===============

Warnings:
```

[1] Covariance matrix calculated using the outer product of gradients (complex-step).
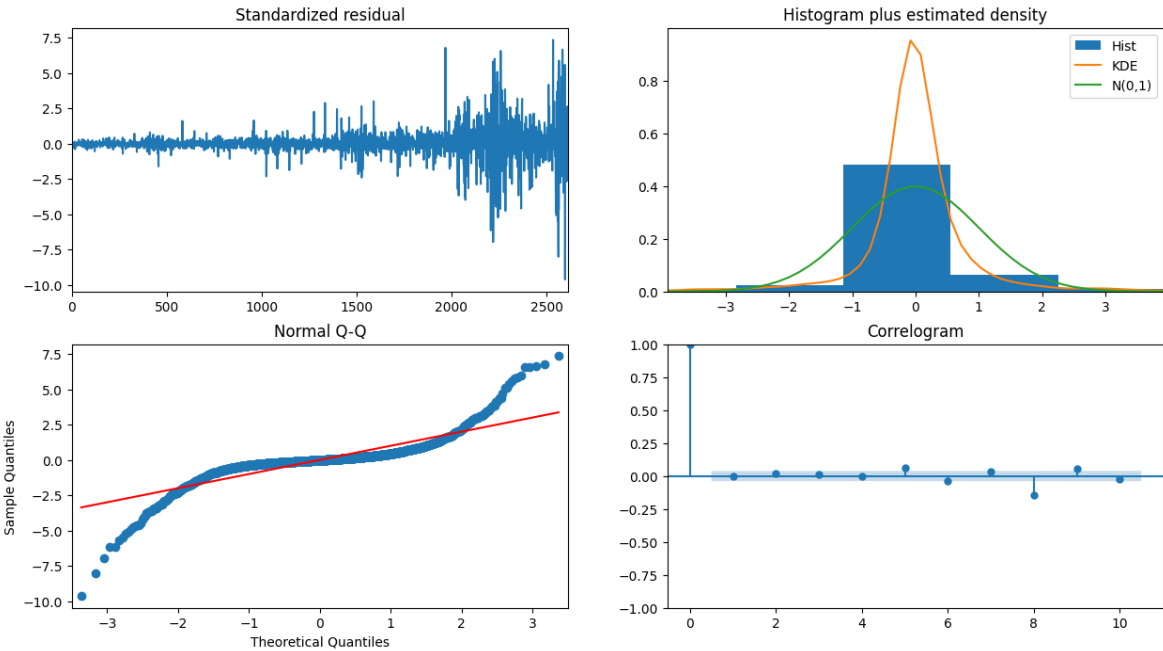
```
******************************************************************
AUTO ARIMA FOR  INTC
******************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=5717.447, Time=0.15 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=5567.979, Time=0.10 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=5593.245, Time=0.08 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=5716.710, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=5560.020, Time=0.06 sec
 ARIMA(3,1,0)(0,0,0)[0] intercept   : AIC=5541.581, Time=0.32 sec
 ARIMA(3,1,1)(0,0,0)[0] intercept   : AIC=5510.558, Time=0.61 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=5554.464, Time=0.42 sec
 ARIMA(3,1,2)(0,0,0)[0] intercept   : AIC=5511.823, Time=0.80 sec
 ARIMA(2,1,2)(0,0,0)[0] intercept   : AIC=5537.812, Time=0.56 sec
 ARIMA(3,1,1)(0,0,0)[0]             : AIC=5510.206, Time=0.38 sec
 ARIMA(2,1,1)(0,0,0)[0]             : AIC=5554.051, Time=0.10 sec
 ARIMA(3,1,0)(0,0,0)[0]             : AIC=5541.088, Time=0.04 sec
 ARIMA(3,1,2)(0,0,0)[0]             : AIC=5511.408, Time=0.43 sec
 ARIMA(2,1,0)(0,0,0)[0]             : AIC=5559.828, Time=0.03 sec
 ARIMA(2,1,2)(0,0,0)[0]             : AIC=5537.430, Time=0.34 sec

Best model:  ARIMA(3,1,1)(0,0,0)[0]
Total fit time: 4.465 seconds
                         SARIMAX Results
=======================================================================
=========
Dep. Variable:                      y   No. Observations:
2616
Model:               SARIMAX(3, 1, 1)   Log Likelihood
-2750.103
Date:                Sun, 19 Mar 2023   AIC
5510.206
Time:                        12:14:09   BIC
5539.551
Sample:                             0   HQIC
5520.835
                              - 2616
Covariance Type:                  opg
=======================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
-----------------------------------------------------------------------
---------
ar.L1         -1.0609      0.022    -49.308      0.000      -1.103
-1.019
ar.L2         -0.1056      0.013     -8.228      0.000      -0.131
-0.080
ar.L3          0.1292      0.008     16.827      0.000       0.114
0.144
ma.L1          0.8515      0.022     39.565      0.000       0.809
0.894
sigma2         0.4797      0.005    106.527      0.000       0.471
0.489
=======================================================================
==============
Ljung-Box (L1) (Q):                 0.02   Jarque-Bera (JB):
```

```
41426.77
Prob(Q):                              0.90    Prob(JB):
0.00
Heteroskedasticity (H):               8.91    Skew:
-0.17
Prob(H) (two-sided):                  0.00    Kurtosis:
22.50
======================================================================
==============
```

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).

```
************************************************************
AUTO ARIMA FOR  MSFT
************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=9345.080, Time=0.16 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=9055.284, Time=0.08 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=9088.002, Time=0.07 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=9347.240, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=9056.841, Time=0.06 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=9057.010, Time=0.12 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=9057.035, Time=0.58 sec
 ARIMA(1,1,0)(0,0,0)[0]             : AIC=9061.483, Time=0.02 sec

Best model:  ARIMA(1,1,0)(0,0,0)[0] intercept
Total fit time: 1.177 seconds
                              SARIMAX Results
=======================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:               SARIMAX(1, 1, 0)   Log Likelihood
-4524.642
Date:                  Sun, 19 Mar 2023   AIC
9055.284
Time:                          12:14:11   BIC
9072.891
Sample:                               0   HQIC
9061.662
                                 - 2616
Covariance Type:                    opg
=======================================================================
=========
                  coef    std err          z      P>|z|      [0.025
0.975]
-----------------------------------------------------------------------
---------
intercept       0.0766      0.027      2.822      0.005       0.023
0.130
ar.L1          -0.3250      0.004    -77.662      0.000      -0.333
-0.317
sigma2          1.8638      0.012    152.463      0.000       1.840
1.888
=======================================================================
==============
Ljung-Box (L1) (Q):                    0.05   Jarque-Bera (JB):
168193.53
Prob(Q):                               0.82   Prob(JB):
0.00
Heteroskedasticity (H):               29.16   Skew:
-0.87
Prob(H) (two-sided):                   0.00   Kurtosis:
42.25
=======================================================================
==============

Warnings:
```

[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
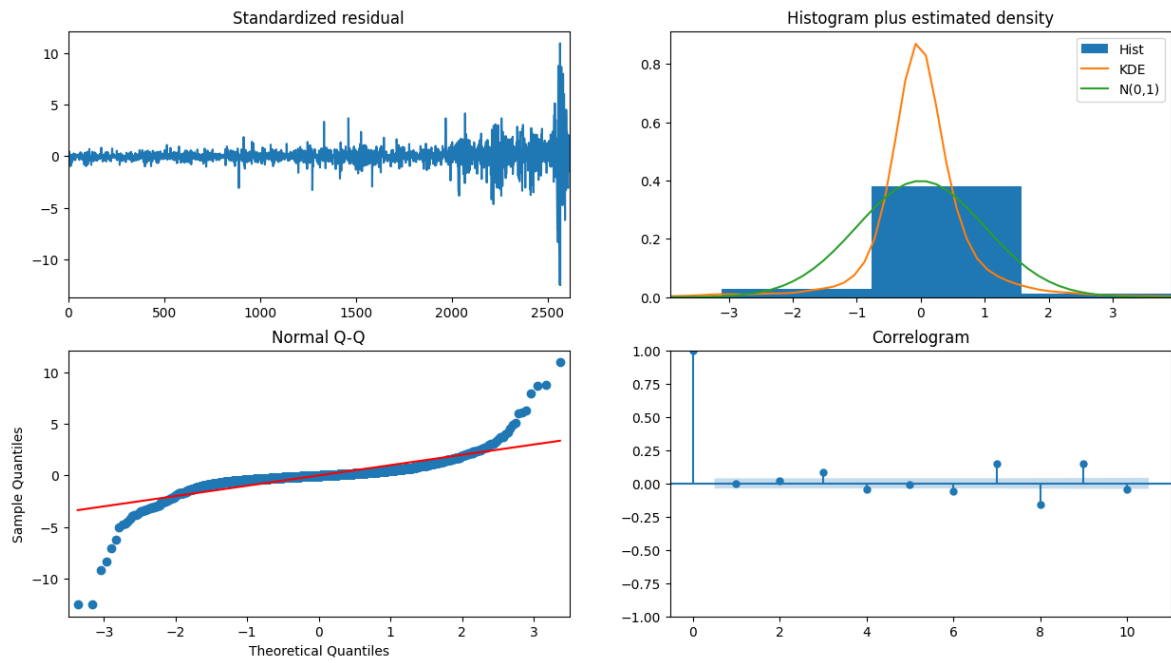
```
**********************************************************************
AUTO ARIMA FOR  NVDA
**********************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=6924.973, Time=0.15 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=6867.160, Time=0.08 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=6878.754, Time=0.08 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=6926.127, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=6839.206, Time=0.06 sec
 ARIMA(3,1,0)(0,0,0)[0] intercept   : AIC=6836.121, Time=0.26 sec
 ARIMA(3,1,1)(0,0,0)[0] intercept   : AIC=6798.789, Time=0.57 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=6838.014, Time=0.43 sec
 ARIMA(3,1,2)(0,0,0)[0] intercept   : AIC=6828.574, Time=1.07 sec
 ARIMA(2,1,2)(0,0,0)[0] intercept   : AIC=6836.552, Time=0.54 sec
 ARIMA(3,1,1)(0,0,0)[0]             : AIC=6799.971, Time=0.40 sec

Best model:  ARIMA(3,1,1)(0,0,0)[0] intercept
Total fit time: 3.668 seconds
                          SARIMAX Results
=======================================================================
=========
Dep. Variable:                        y   No. Observations:
2616
Model:               SARIMAX(3, 1, 1)   Log Likelihood
-3393.395
Date:                Sun, 19 Mar 2023   AIC
6798.789
Time:                        12:14:15   BIC
6834.003
Sample:                             0   HQIC
6811.544
                              - 2616
Covariance Type:                  opg
=======================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
-----------------------------------------------------------------------
---------
intercept      0.0565      0.033      1.700      0.089      -0.009
0.122
ar.L1         -0.9537      0.024    -39.485      0.000      -1.001
-0.906
ar.L2          0.0073      0.012      0.590      0.555      -0.017
0.031
ar.L3          0.1617      0.007     21.772      0.000       0.147
0.176
ma.L1          0.8249      0.022     36.664      0.000       0.781
0.869
sigma2         0.7846      0.006    121.959      0.000       0.772
0.797
=======================================================================
==============
Ljung-Box (L1) (Q):                  0.10   Jarque-Bera (JB):
63341.20
Prob(Q):                             0.76   Prob(JB):
0.00
```

```
Heteroskedasticity (H):            177.91    Skew:
-1.08
Prob(H) (two-sided):                 0.00    Kurtosis:
27.01
======================================================================
==============

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
```
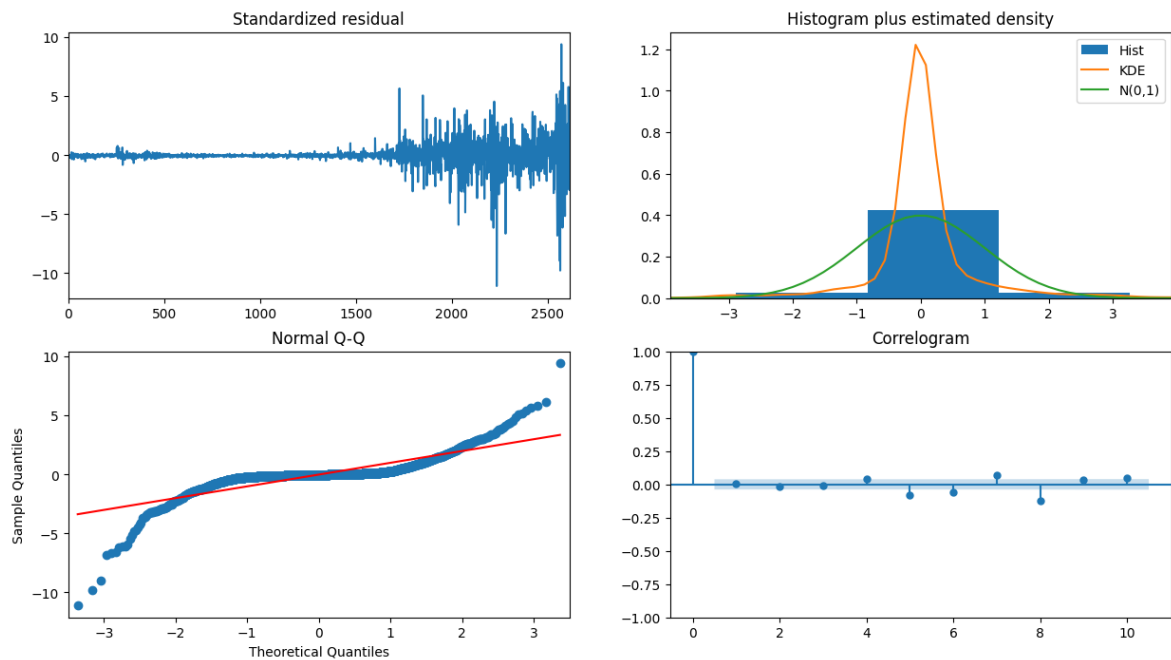
```
****************************************************************
AUTO ARIMA FOR  IBM
****************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=11057.194, Time=0.04 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=11058.008, Time=0.13 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=11058.056, Time=0.11 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=11055.204, Time=0.02 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=11059.365, Time=0.20 sec

Best model:  ARIMA(0,1,0)(0,0,0)[0]
Total fit time: 0.543 seconds
                            SARIMAX Results
==========================================================================
=========
Dep. Variable:                         y   No. Observations:
2616
Model:                   SARIMAX(0, 1, 0)   Log Likelihood
-5526.602
Date:                  Sun, 19 Mar 2023    AIC
11055.204
Time:                          12:14:16    BIC
11061.073
Sample:                               0    HQIC
11057.330
                                 - 2616
Covariance Type:                    opg
==========================================================================
=========
                  coef    std err         z      P>|z|      [0.025
0.975]
--------------------------------------------------------------------------
---------
sigma2         4.0107      0.052     77.780      0.000       3.910
4.112
==========================================================================
==============
Ljung-Box (L1) (Q):                   1.19   Jarque-Bera (JB):
5922.77
Prob(Q):                              0.28   Prob(JB):
0.00
Heteroskedasticity (H):               1.12   Skew:
-0.67
Prob(H) (two-sided):                  0.09   Kurtosis:
10.25
==========================================================================
==============

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
```
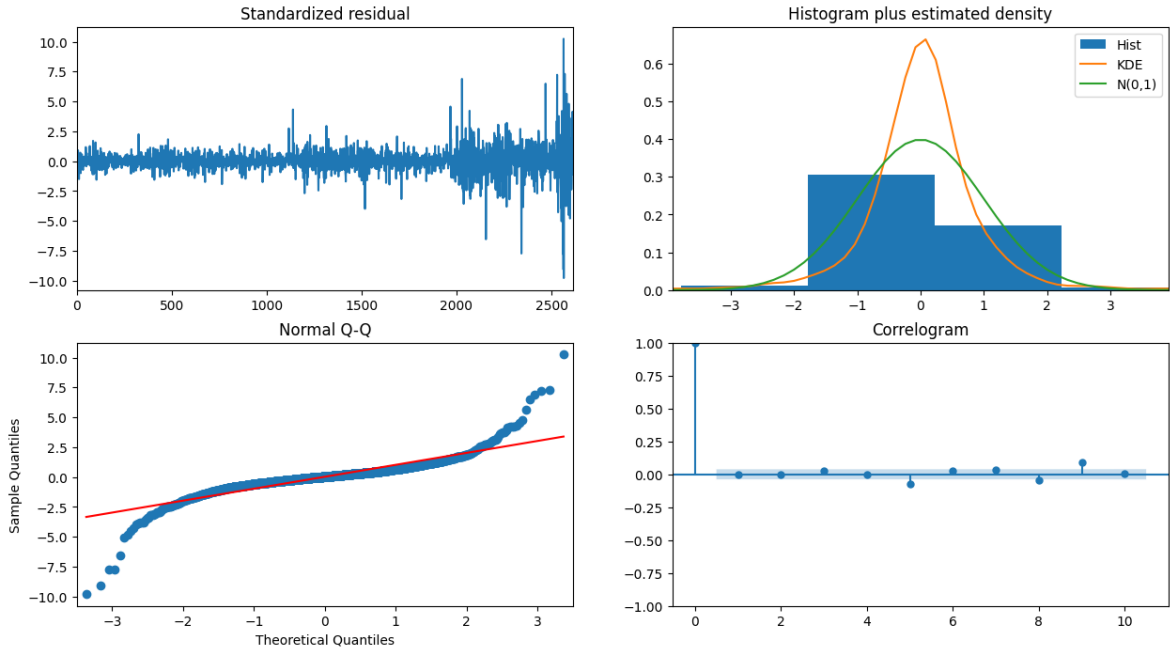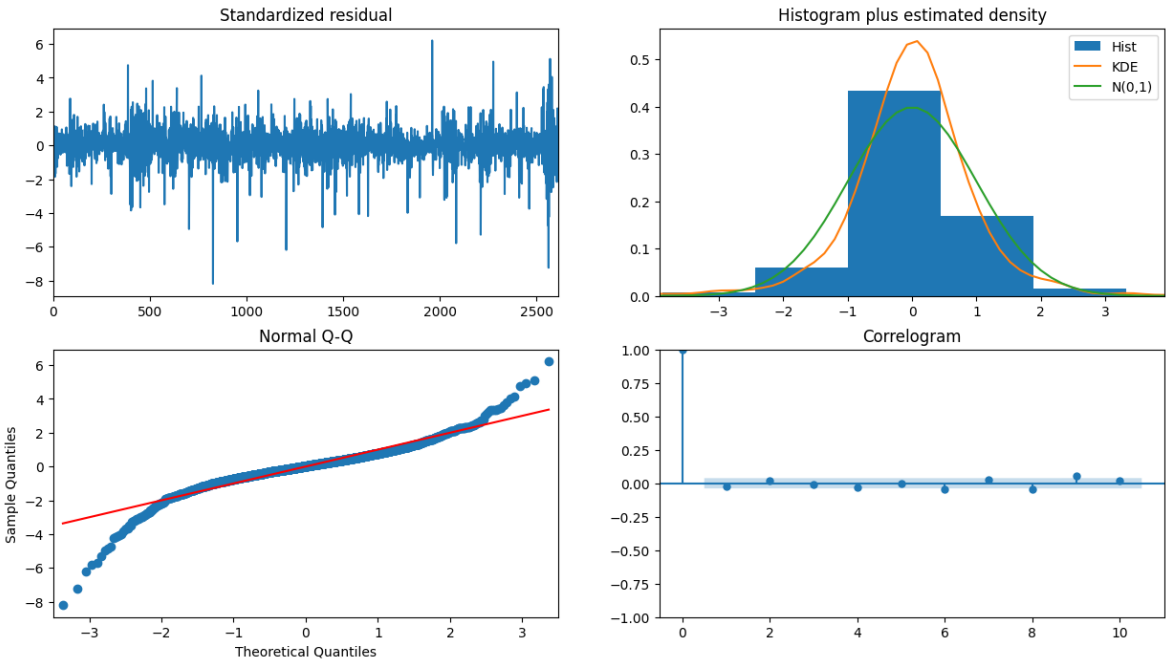
```
**********************************************************************
AUTO ARIMA FOR  NFLX
**********************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=15380.607, Time=0.07 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=15372.681, Time=0.09 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=15373.911, Time=0.16 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=15381.630, Time=0.01 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=15363.246, Time=0.06 sec
 ARIMA(3,1,0)(0,0,0)[0] intercept   : AIC=15356.760, Time=0.32 sec
 ARIMA(3,1,1)(0,0,0)[0] intercept   : AIC=15358.433, Time=0.45 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=15361.623, Time=0.99 sec
 ARIMA(3,1,0)(0,0,0)[0]             : AIC=15357.383, Time=0.04 sec

Best model:  ARIMA(3,1,0)(0,0,0)[0] intercept
Total fit time: 2.196 seconds
                            SARIMAX Results
======================================================================
=========
Dep. Variable:                      y   No. Observations:
2616
Model:               SARIMAX(3, 1, 0)   Log Likelihood
-7673.380
Date:                Sun, 19 Mar 2023   AIC
15356.760
Time:                        12:14:19   BIC
15386.105
Sample:                             0   HQIC
15367.389
                               - 2616
Covariance Type:                  opg
======================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
----------------------------------------------------------------------
---------
intercept      0.1446      0.090      1.606      0.108      -0.032
0.321
ar.L1         -0.0610      0.009     -6.719      0.000      -0.079
-0.043
ar.L2          0.0697      0.009      7.794      0.000       0.052
0.087
ar.L3          0.0571      0.009      6.145      0.000       0.039
0.075
sigma2        20.7149      0.220     93.957      0.000      20.283
21.147
======================================================================
==============
Ljung-Box (L1) (Q):                  0.00   Jarque-Bera (JB):
16664.27
Prob(Q):                             0.96   Prob(JB):
0.00
Heteroskedasticity (H):             83.85   Skew:
-0.25
Prob(H) (two-sided):                 0.00   Kurtosis:
15.36
```

===
==============

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
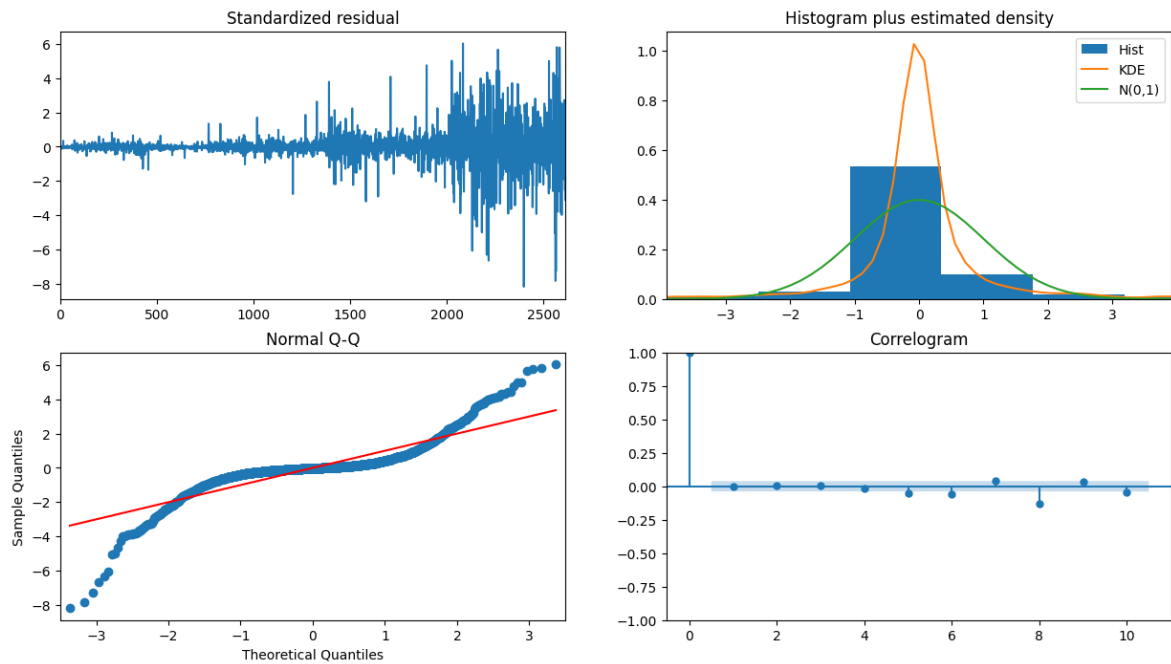
```
*******************************************************************
AUTO ARIMA FOR  GOOGL
*******************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,0,0)(0,0,0)[0]             : AIC=26474.859, Time=0.06 sec
 ARIMA(1,0,0)(0,0,0)[0]             : AIC=inf, Time=0.24 sec
 ARIMA(0,0,1)(0,0,0)[0]             : AIC=inf, Time=0.07 sec
 ARIMA(1,0,1)(0,0,0)[0]             : AIC=5144.132, Time=0.16 sec
 ARIMA(2,0,1)(0,0,0)[0]             : AIC=5171.968, Time=0.25 sec
 ARIMA(1,0,2)(0,0,0)[0]             : AIC=5144.305, Time=0.47 sec
 ARIMA(0,0,2)(0,0,0)[0]             : AIC=19730.973, Time=0.42 sec
 ARIMA(2,0,0)(0,0,0)[0]             : AIC=inf, Time=0.18 sec
 ARIMA(2,0,2)(0,0,0)[0]             : AIC=5119.792, Time=0.61 sec
 ARIMA(3,0,2)(0,0,0)[0]             : AIC=5030.509, Time=0.58 sec
 ARIMA(3,0,1)(0,0,0)[0]             : AIC=5110.959, Time=0.59 sec
 ARIMA(3,0,3)(0,0,0)[0]             : AIC=5031.473, Time=0.69 sec
 ARIMA(2,0,3)(0,0,0)[0]             : AIC=5107.090, Time=0.69 sec
 ARIMA(3,0,2)(0,0,0)[0] intercept  : AIC=5030.878, Time=1.09 sec

Best model:  ARIMA(3,0,2)(0,0,0)[0]
Total fit time: 6.139 seconds
                            SARIMAX Results
==================================================================
=========
Dep. Variable:                      y   No. Observations:
2616
Model:               SARIMAX(3, 0, 2)   Log Likelihood
-2509.255
Date:               Sun, 19 Mar 2023   AIC
5030.509
Time:                        12:14:26   BIC
5065.726
Sample:                             0   HQIC
5043.265
                              - 2616
Covariance Type:                  opg
==================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
------------------------------------------------------------------
---------
ar.L1         -0.7638      0.008    -92.377      0.000      -0.780
-0.748
ar.L2          0.8438      0.004    212.654      0.000       0.836
0.852
ar.L3          0.9197      0.008    113.363      0.000       0.904
0.936
ma.L1          1.7049      0.012    145.458      0.000       1.682
1.728
ma.L2          0.8351      0.011     72.901      0.000       0.813
0.858
sigma2         0.3973      0.004     96.802      0.000       0.389
0.405
==================================================================
==============
Ljung-Box (L1) (Q):                  0.66   Jarque-Bera (JB):
```

```
24234.68
Prob(Q):                                    0.42    Prob(JB):
0.00
Heteroskedasticity (H):                     14.51   Skew:
-0.30
Prob(H) (two-sided):                        0.00    Kurtosis:
17.90
==========================================================================
==============
```

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
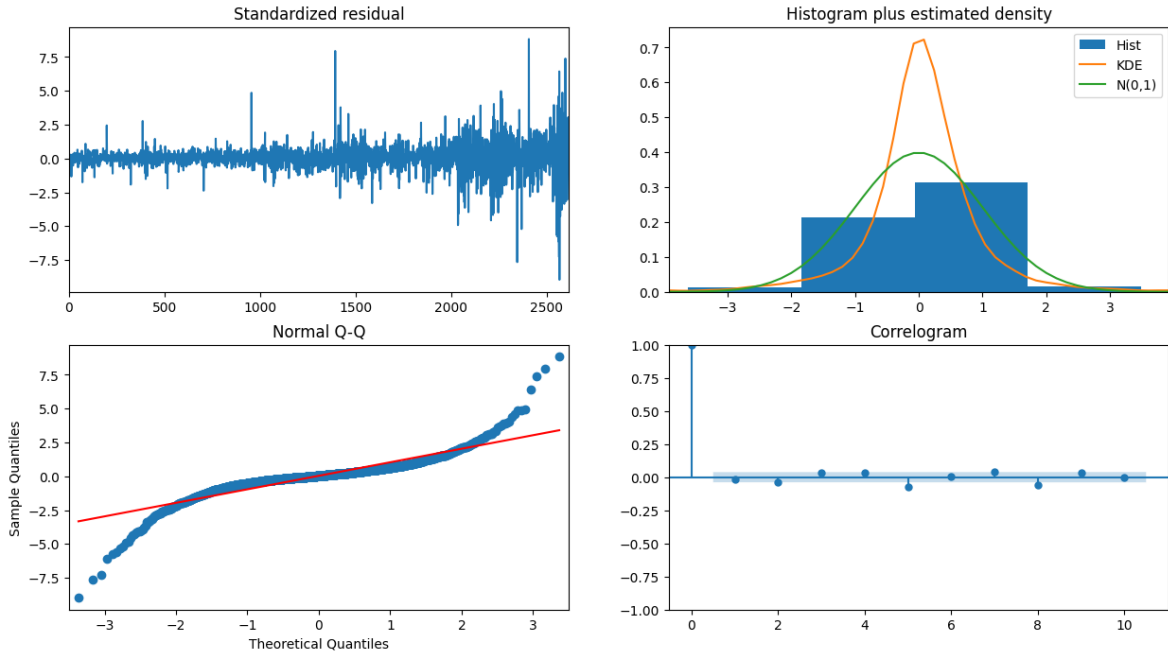
```
****************************************************************
AUTO ARIMA FOR  CRM
****************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=10658.052, Time=0.07 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=10610.589, Time=0.14 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=10616.262, Time=0.09 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=10658.817, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=10603.631, Time=0.06 sec
 ARIMA(3,1,0)(0,0,0)[0] intercept   : AIC=10605.542, Time=0.18 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=10605.604, Time=0.35 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=10605.954, Time=0.12 sec
 ARIMA(3,1,1)(0,0,0)[0] intercept   : AIC=10602.127, Time=0.63 sec
 ARIMA(3,1,2)(0,0,0)[0] intercept   : AIC=10504.039, Time=0.81 sec
 ARIMA(2,1,2)(0,0,0)[0] intercept   : AIC=10502.053, Time=0.81 sec
 ARIMA(1,1,2)(0,0,0)[0] intercept   : AIC=10604.596, Time=0.41 sec
 ARIMA(2,1,3)(0,0,0)[0] intercept   : AIC=10598.016, Time=1.14 sec
 ARIMA(1,1,3)(0,0,0)[0] intercept   : AIC=10599.323, Time=0.63 sec
 ARIMA(3,1,3)(0,0,0)[0] intercept   : AIC=10602.215, Time=1.31 sec
 ARIMA(2,1,2)(0,0,0)[0]             : AIC=10503.341, Time=0.47 sec

Best model:  ARIMA(2,1,2)(0,0,0)[0] intercept
Total fit time: 7.331 seconds
                         SARIMAX Results
================================================================
=========
Dep. Variable:                      y   No. Observations:
2616
Model:              SARIMAX(2, 1, 2)   Log Likelihood
-5245.026
Date:               Sun, 19 Mar 2023   AIC
10502.053
Time:                       12:14:34   BIC
10537.267
Sample:                            0   HQIC
10514.808
                              - 2616
Covariance Type:                 opg
================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
----------------------------------------------------------------
---------
intercept      0.2221      0.127      1.753      0.080      -0.026
0.470
ar.L1         -1.7576      0.007   -243.442      0.000      -1.772
-1.743
ar.L2         -0.9162      0.008   -116.204      0.000      -0.932
-0.901
ma.L1          1.6682      0.010    160.385      0.000       1.648
1.689
ma.L2          0.8148      0.011     72.367      0.000       0.793
0.837
sigma2         3.2331      0.035     91.417      0.000       3.164
3.302
================================================================
```

```
==============
Ljung-Box (L1) (Q):                     0.01    Jarque-Bera (JB):
24375.96
Prob(Q):                                0.93    Prob(JB):
0.00
Heteroskedasticity (H):                 10.62   Skew:
-0.95
Prob(H) (two-sided):                    0.00    Kurtosis:
17.84
======================================================================
==============
```

Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
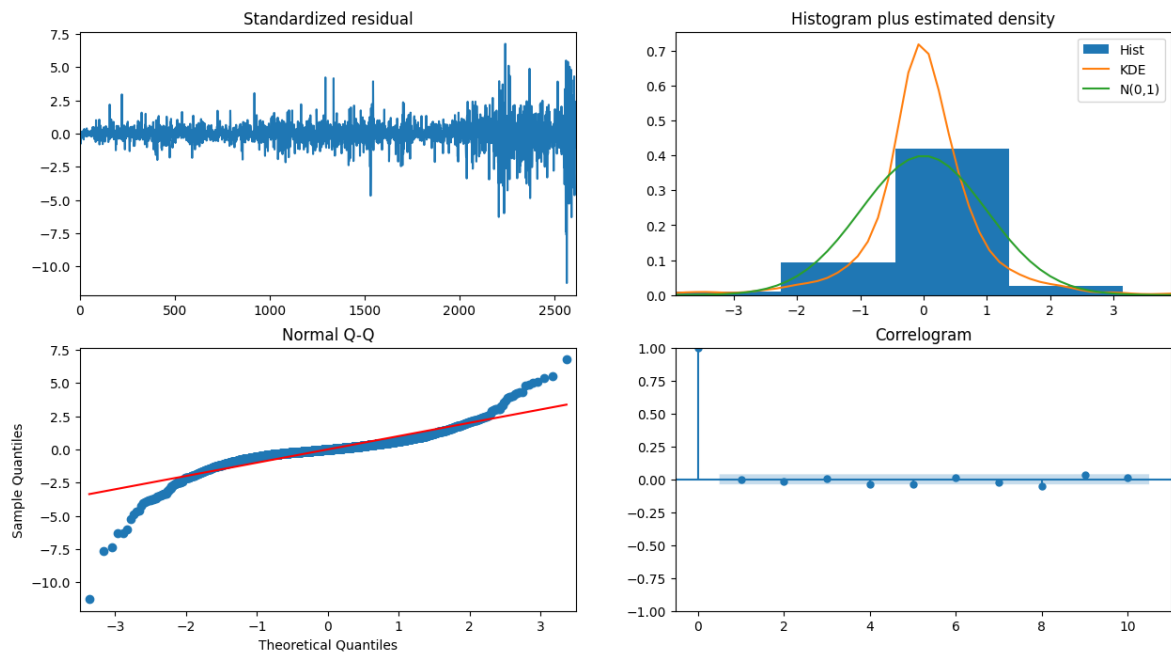
```
***********************************************************************
AUTO ARIMA FOR  CSCO
***********************************************************************
Performing stepwise search to minimize aic
 ARIMA(0,1,0)(0,0,0)[0] intercept   : AIC=4104.370, Time=0.12 sec
 ARIMA(1,1,0)(0,0,0)[0] intercept   : AIC=4075.851, Time=0.09 sec
 ARIMA(0,1,1)(0,0,0)[0] intercept   : AIC=4076.796, Time=0.10 sec
 ARIMA(0,1,0)(0,0,0)[0]             : AIC=4102.923, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0] intercept   : AIC=4077.710, Time=0.06 sec
 ARIMA(1,1,1)(0,0,0)[0] intercept   : AIC=4077.765, Time=0.14 sec
 ARIMA(2,1,1)(0,0,0)[0] intercept   : AIC=4079.317, Time=0.52 sec
 ARIMA(1,1,0)(0,0,0)[0]             : AIC=4074.538, Time=0.02 sec
 ARIMA(2,1,0)(0,0,0)[0]             : AIC=4076.387, Time=0.03 sec
 ARIMA(1,1,1)(0,0,0)[0]             : AIC=4076.448, Time=0.03 sec
 ARIMA(0,1,1)(0,0,0)[0]             : AIC=4075.494, Time=0.03 sec
 ARIMA(2,1,1)(0,0,0)[0]             : AIC=4077.972, Time=0.17 sec

Best model:  ARIMA(1,1,0)(0,0,0)[0]
Total fit time: 1.436 seconds
                           SARIMAX Results
===================================================================
=========
Dep. Variable:                       y   No. Observations:
2616
Model:               SARIMAX(1, 1, 0)   Log Likelihood
-2035.269
Date:                 Sun, 19 Mar 2023   AIC
4074.538
Time:                        12:14:37   BIC
4086.276
Sample:                             0   HQIC
4078.789
                                - 2616
Covariance Type:                   opg
===================================================================
=========
                 coef    std err          z      P>|z|      [0.025
0.975]
-------------------------------------------------------------------
---------
ar.L1         -0.1075      0.008    -13.317      0.000      -0.123
-0.092
sigma2         0.2777      0.003     99.713      0.000       0.272
0.283
===================================================================
==============
Ljung-Box (L1) (Q):                  0.00   Jarque-Bera (JB):
19704.75
Prob(Q):                             0.98   Prob(JB):
0.00
Heteroskedasticity (H):              3.80   Skew:
-0.75
Prob(H) (two-sided):                 0.00   Kurtosis:
16.36
===================================================================
==============
```

```
Warnings:
[1] Covariance matrix calculated using the outer product of gradients
(complex-step).
```
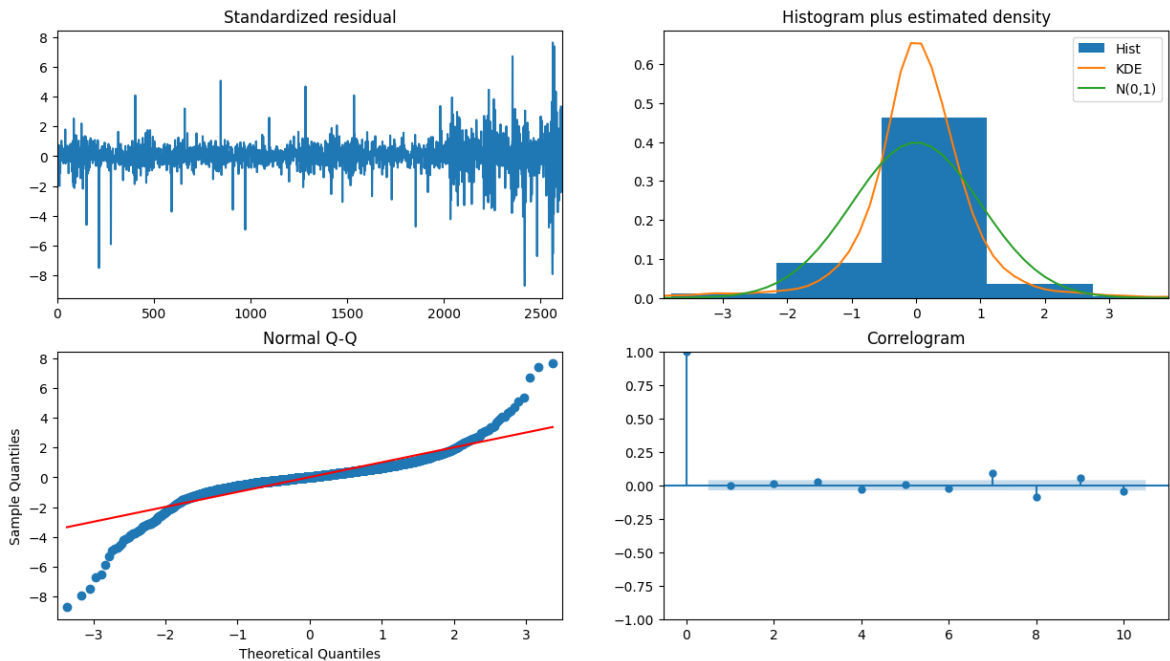

Auto ARIMA model has saved the p, q, and d for each company in a new dataframe named aa

In [29]: `aa`

Out[29]:

	AAPL	ADBE	ORCL	AMZN	INTC	MSFT	NVDA	IBM	NFLX	GOOGL	CRM	CSCO
p	3	1	3	1	3	1	3	0	3	3	2	1
q	1	1	0	1	1	1	1	1	1	0	1	1
d	1	0	3	0	1	0	1	0	0	2	2	0

Calculations Performed

The calculations performed for this analysis are as follows:

```
In [30]: for column in column_names:
             column_name = df[column].name
             print("FUTURE FORECAST FOR: " ,column_name)
             print("------------------------------------------------------------
             print(future_forecast[column_name].tail())
             print("------------------------------------------------------------
```

```
FUTURE FORECAST FOR:  AAPL
----------------------------------------------------------------
2648    79.994821
2649    80.022148
2650    80.049451
2651    80.076770
2652    80.104079
Name: AAPL, dtype: float64
----------------------------------------------------------------
FUTURE FORECAST FOR:  ADBE
----------------------------------------------------------------
2648    383.119713
2649    383.250316
2650    383.380920
2651    383.511524
2652    383.642128
Name: ADBE, dtype: float64
----------------------------------------------------------------
FUTURE FORECAST FOR:  ORCL
```

```
In [31]: future_forecast.to_csv('Datasets2/future_forecast.csv')
```

```python
In [32]: difference_df = pd.DataFrame()
         accuracy_df = pd.DataFrame()
         forecast_df = pd.DataFrame()
         actual_df = pd.DataFrame()

         # actual_df.
         for column in column_names:
             j = 1
             difference_series = []
             accuracy_series = []
             forecast_series = []
             actual_series = []
             column_name = df[column].name

             for i in range(2616, 2652 ):
                 print("Day Number", i, "for stock", column_name)
                 sample_forecast = future_forecast[column_name].loc[i]
                 forecast_series.append(sample_forecast)
                 print("Day Forecast: ", sample_forecast)
                 sample_actual = df[column_name].loc[i]
                 actual_series.append(sample_actual)
                 print("Day Actual: ", sample_actual)
                 sample_difference = sample_forecast - sample_actual
                 difference_series.append(sample_difference)
                 print("Day Difference: ", sample_difference)
                 if sample_forecast > sample_actual:
                     sample_accuracy = sample_actual / sample_forecast
                 else:
                     sample_accuracy = sample_forecast / sample_actual
                 print("Day Accuracy: ", sample_accuracy)
                 print("_____")
                 sample_accuracy = sample_accuracy
                 sample_accuracy_total = (sample_accuracy + accuracy_series) / j
                 accuracy_series.append(sample_accuracy)
                 j = j+1
             forecast_df[column_name] = pd.DataFrame(forecast_series)
             actual_df[column_name] = pd.DataFrame(actual_series)
             difference_df[column_name] = pd.DataFrame(difference_series)
             accuracy_df[column_name] = pd.DataFrame(accuracy_series)
```

```
Day Number 2616 for stock AAPL
Day Forecast:  78.96470734618956
Day Actual:  79.527496
Day Difference:  -0.5627886538104434
Day Accuracy:  0.9929233449798238
_____
Day Number 2617 for stock AAPL
Day Forecast:  79.35962885898498
Day Actual:  79.5625
Day Difference:  -0.20287114101502368
Day Accuracy:  0.9974501663344537
_____
Day Number 2618 for stock AAPL
Day Forecast:  78.97986165712203
Day Actual:  79.485001
Day Difference:  -0.5051393428779676
Day Accuracy:  0.9936448469960015
_____
Day Number 2619 for stock AAPL
Day Forecast:  79.36909137928595
Day Actual:  80.462502
Day Difference:  -1.093410620714053
Day Accuracy:  0.9864109293952349
_____
Day Number 2620 for stock AAPL
Day Forecast:  79.09745856555556
Day Actual:  80.834999
Day Difference:  -1.7375404344444405
Day Accuracy:  0.9785050973471968
_____
Day Number 2621 for stock AAPL
Day Forecast:  79.35947881445122
Day Actual:  81.279999
Day Difference:  -1.9205201855487815
Day Accuracy:  0.9763715525445715
_____
Day Number 2622 for stock AAPL
Day Forecast:  79.20803050146272
Day Actual:  80.580002
Day Difference:  -1.3719714985372775
Day Accuracy:  0.9829737966680954
_____
Day Number 2623 for stock AAPL
Day Forecast:  79.36859325003738
Day Actual:  82.875
Day Difference:  -3.506406749962622
Day Accuracy:  0.9576904162900438
_____
Day Number 2624 for stock AAPL
Day Forecast:  79.2980861370587
Day Actual:  83.364998
Day Difference:  -4.066911862941296
Day Accuracy:  0.9512155945479505
_____
Day Number 2625 for stock AAPL
Day Forecast:  79.39639643658887
Day Actual:  85.997498
```

```
Day Difference:  -6.60110156341112
Day Accuracy:  0.9232407719186072

_____

Day Number 2626 for stock AAPL
Day Forecast:  79.37262205469709
Day Actual:  88.209999
Day Difference:  -8.837376945302907
Day Accuracy:  0.8998143402620047

_____

Day Number 2627 for stock AAPL
Day Forecast:  79.43645105267659
Day Actual:  83.974998
Day Difference:  -4.538546947323411
Day Accuracy:  0.9459535926714352

_____

Day Number 2628 for stock AAPL
Day Forecast:  79.43779878641591
Day Actual:  84.699997
Day Difference:  -5.262198213584085
Day Accuracy:  0.937872510035814

_____

Day Number 2629 for stock AAPL
Day Forecast:  79.4834981500289
Day Actual:  85.747498
Day Difference:  -6.2639998499711
Day Accuracy:  0.9269483075766117

_____

Day Number 2630 for stock AAPL
Day Forecast:  79.49783393107435
Day Actual:  88.019997
Day Difference:  -8.52216306892565
Day Accuracy:  0.9031792392707574

_____

Day Number 2631 for stock AAPL
Day Forecast:  79.53428161347395
Day Actual:  87.897499
Day Difference:  -8.363217386526046
Day Accuracy:  0.9048526126263724

_____

Day Number 2632 for stock AAPL
Day Forecast:  79.55517798873355
Day Actual:  87.932503
Day Difference:  -8.37732501126645
Day Accuracy:  0.904730051739043

_____

Day Number 2633 for stock AAPL
Day Forecast:  79.58699002640769
Day Actual:  87.43
Day Difference:  -7.843009973592316
Day Accuracy:  0.9102938353700982

_____

Day Number 2634 for stock AAPL
Day Forecast:  79.61115250528961
Day Actual:  89.717499
Day Difference:  -10.106346494710394
Day Accuracy:  0.8873536756222954

_____
```

```
Day Number 2635 for stock AAPL
Day Forecast:  79.64066869024425
Day Actual:  91.6325
Day Difference:  -11.991831309755739
Day Accuracy:  0.8691312437207788
_____
Day Number 2636 for stock AAPL
Day Forecast:  79.66644197501176
Day Actual:  90.014999
Day Difference:  -10.348557024988239
Day Accuracy:  0.8850351925795362
_____
Day Number 2637 for stock AAPL
Day Forecast:  79.69482971692676
Day Actual:  91.209999
Day Difference:  -11.515169283073234
Day Accuracy:  0.8737510206192061
_____
Day Number 2638 for stock AAPL
Day Forecast:  79.72139254397523
Day Actual:  88.407501
Day Difference:  -8.686108456024769
Day Accuracy:  0.9017491914399348
_____
Day Number 2639 for stock AAPL
Day Forecast:  79.74922842587532
Day Actual:  90.445
Day Difference:  -10.695771574124677
Day Accuracy:  0.8817428097282914
_____
Day Number 2640 for stock AAPL
Day Forecast:  79.77617666031874
Day Actual:  91.199997
Day Difference:  -11.423820339681257
Day Accuracy:  0.8747388079444646
_____
Day Number 2641 for stock AAPL
Day Forecast:  79.80374356615715
Day Actual:  91.027496
Day Difference:  -11.223752433842847
Day Accuracy:  0.8766993169421814
_____
Day Number 2642 for stock AAPL
Day Forecast:  79.83087941346966
Day Actual:  91.027496
Day Difference:  -11.19661658653034
Day Accuracy:  0.876997422992605
_____
Day Number 2643 for stock AAPL
Day Forecast:  79.85831551853352
Day Actual:  93.462502
Day Difference:  -13.604186481466485
Day Accuracy:  0.8544423037009379
_____
Day Number 2644 for stock AAPL
Day Forecast:  79.88554252329746
Day Actual:  93.172501
```

```
Day Difference:  -13.286958476702537
Day Accuracy:  0.8573939914234723

_____
Day Number 2645 for stock AAPL
Day Forecast:  79.91291511906248
Day Actual:  95.342499
Day Difference:  -15.429583880937528
Day Accuracy:  0.8381667772213782

_____
Day Number 2646 for stock AAPL
Day Forecast:  79.94018635919782
Day Actual:  95.752502
Day Difference:  -15.812315640802183
Day Accuracy:  0.8348626374191018

_____
Day Number 2647 for stock AAPL
Day Forecast:  79.96752815083273
Day Actual:  95.919998
Day Difference:  -15.952469849167272
Day Accuracy:  0.833689843809554

_____
Day Number 2648 for stock AAPL
Day Forecast:  79.99482083820517
Day Actual:  95.477501
Day Difference:  -15.482680161794832
Day Accuracy:  0.8378394909833802

_____
Day Number 2649 for stock AAPL
Day Forecast:  80.0221476994807
Day Actual:  97.057503
Day Difference:  -17.0353553005193
Day Accuracy:  0.8244818301113794

_____
Day Number 2650 for stock AAPL
Day Forecast:  80.04945077927351
Day Actual:  97.724998
Day Difference:  -17.675547220726486
Day Accuracy:  0.8191297254288357

_____
Day Number 2651 for stock AAPL
Day Forecast:  80.07677040752698
Day Actual:  96.522499
Day Difference:  -16.445728592473017
Day Accuracy:  0.8296176667320536

_____
Day Number 2616 for stock ADBE
Day Forecast:  379.66240052836656
Day Actual:  375.170013
Day Difference:  4.492387528366578
Day Accuracy:  0.988167415255989

_____
Day Number 2617 for stock ADBE
Day Forecast:  378.83183893693047
Day Actual:  379.829987
Day Difference:  -0.9981480630695501
Day Accuracy:  0.9973721188499276

_____
```

```
Day Number 2618 for stock ADBE
Day Forecast:  379.28081132078
Day Actual:  386.600006
Day Difference:  -7.319194679220004
Day Accuracy:  0.9810677843620623
_____
Day Number 2619 for stock ADBE
Day Forecast:  379.30596145055443
Day Actual:  389.679993
Day Difference:  -10.37403154944559
Day Accuracy:  0.9733780749953832
_____
Day Number 2620 for stock ADBE
Day Forecast:  379.4714949593706
Day Actual:  390.440002
Day Difference:  -10.96850704062939
Day Accuracy:  0.971907317425356
_____
Day Number 2621 for stock ADBE
Day Forecast:  379.59052903848084
Day Actual:  389.920013
Day Difference:  -10.329483961519145
Day Accuracy:  0.9735087104607807
_____
Day Number 2622 for stock ADBE
Day Forecast:  379.7249652042037
Day Actual:  385.799988
Day Difference:  -6.075022795796258
Day Accuracy:  0.9842534396455288
_____
Day Number 2623 for stock ADBE
Day Forecast:  379.85429971011007
Day Actual:  392.899994
Day Difference:  -13.045694289889923
Day Accuracy:  0.9667963998750024
_____
Day Number 2624 for stock ADBE
Day Forecast:  379.9853240476307
Day Actual:  397.779999
Day Difference:  -17.79467495236929
Day Accuracy:  0.9552650334428472
_____
Day Number 2625 for stock ADBE
Day Forecast:  380.1157886592999
Day Actual:  397.160004
Day Difference:  -17.044215340700134
Day Accuracy:  0.9570847639010999
_____
Day Number 2626 for stock ADBE
Day Forecast:  380.246438669932
Day Actual:  406.820007
Day Difference:  -26.573568330067985
Day Accuracy:  0.9346797899001363
_____
Day Number 2627 for stock ADBE
Day Forecast:  380.3770272705446
Day Actual:  387.670013
```

```
Day Difference:  -7.292985729455381
Day Accuracy:  0.9811876454590379

_____

Day Number 2628 for stock ADBE
Day Forecast:  380.5076362121043
Day Actual:  406.540009
Day Difference:  -26.032372787895724
Day Accuracy:  0.9359660249628821

_____

Day Number 2629 for stock ADBE
Day Forecast:  380.63823841609684
Day Actual:  401.339996
Day Difference:  -20.701757583903145
Day Accuracy:  0.9484184038714568

_____

Day Number 2630 for stock ADBE
Day Forecast:  380.7688428517854
Day Actual:  411.670013
Day Difference:  -30.90117014821459
Day Accuracy:  0.9249370389574268

_____

Day Number 2631 for stock ADBE
Day Forecast:  380.8994465482654
Day Actual:  413.48999
Day Difference:  -32.59054345173456
Day Accuracy:  0.92118178374346

_____

Day Number 2632 for stock ADBE
Day Forecast:  381.03005048959477
Day Actual:  420.459991
Day Difference:  -39.42994051040523
Day Accuracy:  0.906221896602749

_____

Day Number 2633 for stock ADBE
Day Forecast:  381.16065434982227
Day Actual:  428.01001
Day Difference:  -46.849355650177756
Day Accuracy:  0.8905414486680399

_____

Day Number 2634 for stock ADBE
Day Forecast:  381.2912582369133
Day Actual:  438.640015
Day Difference:  -57.348756763086726
Day Accuracy:  0.8692578086769245

_____

Day Number 2635 for stock ADBE
Day Forecast:  381.42186211510625
Day Actual:  440.549988
Day Difference:  -59.128125884893734
Day Accuracy:  0.8657856599807835

_____

Day Number 2636 for stock ADBE
Day Forecast:  381.55246599624655
Day Actual:  431.679993
Day Difference:  -50.12752700375347
Day Accuracy:  0.8838780397131968

_____
```

```
Day Number 2637 for stock ADBE
Day Forecast:  381.68306987641057
Day Actual:  436.950012
Day Difference:  -55.266942123589445
Day Accuracy:  0.873516556572175
_____
Day Number 2638 for stock ADBE
Day Forecast:  381.81367375689797
Day Actual:  426.920013
Day Difference:  -45.10633924310201
Day Accuracy:  0.8943447534208193
_____
Day Number 2639 for stock ADBE
Day Forecast:  381.9442776372783
Day Actual:  424.200012
Day Difference:  -42.25573436272174
Day Accuracy:  0.9003872391151141
_____
Day Number 2640 for stock ADBE
Day Forecast:  382.07488151769405
Day Actual:  435.309998
Day Difference:  -53.235116482305955
Day Accuracy:  0.8777075722430203
_____
Day Number 2641 for stock ADBE
Day Forecast:  382.20548539809806
Day Actual:  439.809998
Day Difference:  -57.604512601901945
Day Accuracy:  0.8690240948049073
_____
Day Number 2642 for stock ADBE
Day Forecast:  382.336089278506
Day Actual:  442.950012
Day Difference:  -60.61392272149402
Day Accuracy:  0.8631585481896453
_____
Day Number 2643 for stock ADBE
Day Forecast:  382.4666931589126
Day Actual:  452.589996
Day Difference:  -70.12330284108737
Day Accuracy:  0.8450621899272219
_____
Day Number 2644 for stock ADBE
Day Forecast:  382.59729703931964
Day Actual:  449.359985
Day Difference:  -66.76268796068035
Day Accuracy:  0.8514271626551697
_____
Day Number 2645 for stock ADBE
Day Forecast:  382.72790091972655
Day Actual:  457.679993
Day Difference:  -74.95209208027347
Day Accuracy:  0.8362347202704282
_____
Day Number 2646 for stock ADBE
Day Forecast:  382.8585048001335
Day Actual:  460.839996
```

```
Day Difference:  -77.98149119986647
Day Accuracy:  0.8307840207518219

_____

Day Number 2647 for stock ADBE
Day Forecast:  382.9891086805404
Day Actual:  466.200012
Day Difference:  -83.21090331945959
Day Accuracy:  0.8215124384864675

_____

Day Number 2648 for stock ADBE
Day Forecast:  383.1197125609474
Day Actual:  442.470001
Day Difference:  -59.35028843905263
Day Accuracy:  0.865865960844987

_____

Day Number 2649 for stock ADBE
Day Forecast:  383.25031644135436
Day Actual:  433.779999
Day Difference:  -50.52968255864562
Day Accuracy:  0.8835131110813488

_____

Day Number 2650 for stock ADBE
Day Forecast:  383.3809203217613
Day Actual:  433.01001
Day Difference:  -49.6290896782387
Day Accuracy:  0.8853858143412465

_____

Day Number 2651 for stock ADBE
Day Forecast:  383.5115242021683
Day Actual:  426.290009
Day Difference:  -42.77848479783171
Day Accuracy:  0.899649337552662

_____

Day Number 2616 for stock ORCL
Day Forecast:  52.54835296895949
Day Actual:  53.200001
Day Difference:  -0.6516480310405086
Day Accuracy:  0.9877509770903856

_____

Day Number 2617 for stock ORCL
Day Forecast:  52.781998263132714
Day Actual:  53.619999
Day Difference:  -0.8380007368672864
Day Accuracy:  0.9843714891365946

_____

Day Number 2618 for stock ORCL
Day Forecast:  52.55611483598823
Day Actual:  53.77
Day Difference:  -1.2138851640117707
Day Accuracy:  0.9774244901615814

_____

Day Number 2619 for stock ORCL
Day Forecast:  52.72166696292493
Day Actual:  53.060001
Day Difference:  -0.3383340370750716
Day Accuracy:  0.9936235576573949

_____
```

```
Day Number 2620 for stock ORCL
Day Forecast:  52.612480423413714
Day Actual:  53.279999
Day Difference:  -0.6675185765862821
Day Accuracy:  0.9874714979520498

_____
Day Number 2621 for stock ORCL
Day Forecast:  52.63381385818936
Day Actual:  53.490002
Day Difference:  -0.8561881418106339
Day Accuracy:  0.9839934920583732

_____
Day Number 2622 for stock ORCL
Day Forecast:  52.6734592690034
Day Actual:  52.849998
Day Difference:  -0.17653873099659734
Day Accuracy:  0.9966596265340143

_____
Day Number 2623 for stock ORCL
Day Forecast:  52.56275338095598
Day Actual:  53.98
Day Difference:  -1.4172466190440147
Day Accuracy:  0.9737449681540568

_____
Day Number 2624 for stock ORCL
Day Forecast:  52.7006811469852
Day Actual:  55.099998
Day Difference:  -2.3993168530148026
Day Accuracy:  0.9564552279472895

_____
Day Number 2625 for stock ORCL
Day Forecast:  52.536078288150385
Day Actual:  54.18
Day Difference:  -1.6439217118496146
Day Accuracy:  0.969658144853274

_____
Day Number 2626 for stock ORCL
Day Forecast:  52.680185689485455
Day Actual:  54.110001
Day Difference:  -1.4298153105145417
Day Accuracy:  0.9735757663261817

_____
Day Number 2627 for stock ORCL
Day Forecast:  52.55345286053964
Day Actual:  51.310001
Day Difference:  1.2434518605396434
Day Accuracy:  0.9763392927989075

_____
Day Number 2628 for stock ORCL
Day Forecast:  52.62519281067222
Day Actual:  51.860001
Day Difference:  0.7651918106722206
Day Accuracy:  0.9854595913135155

_____
Day Number 2629 for stock ORCL
Day Forecast:  52.5918635125017
Day Actual:  53.25
```

```
Day Difference:  -0.6581364874982967
Day Accuracy:  0.987640629342755

_____

Day Number 2630 for stock ORCL
Day Forecast:  52.56433572494988
Day Actual:  54.59
Day Difference:  -2.0256642750501257
Day Accuracy:  0.962893125571531

_____

Day Number 2631 for stock ORCL
Day Forecast:  52.62162392637336
Day Actual:  51.52
Day Difference:  1.1016239263733567
Day Accuracy:  0.9790651856750997

_____

Day Number 2632 for stock ORCL
Day Forecast:  52.524074937784405
Day Actual:  53.689999
Day Difference:  -1.1659240622155949
Day Accuracy:  0.9782841481852962

_____

Day Number 2633 for stock ORCL
Day Forecast:  52.622915796208424
Day Actual:  54.400002
Day Difference:  -1.7770862037915762
Day Accuracy:  0.9673329753960014

_____

Day Number 2634 for stock ORCL
Day Forecast:  52.515431111667205
Day Actual:  55.119999
Day Difference:  -2.604567888332795
Day Accuracy:  0.9527473161178251

_____

Day Number 2635 for stock ORCL
Day Forecast:  52.59422747336552
Day Actual:  55.189999
Day Difference:  -2.595771526634479
Day Accuracy:  0.9529666321132841

_____

Day Number 2636 for stock ORCL
Day Forecast:  52.53110175675386
Day Actual:  54.439999
Day Difference:  -1.9088972432461375
Day Accuracy:  0.9649357590317712

_____

Day Number 2637 for stock ORCL
Day Forecast:  52.54980638857704
Day Actual:  54.529999
Day Difference:  -1.9801926114229573
Day Accuracy:  0.963686179208935

_____

Day Number 2638 for stock ORCL
Day Forecast:  52.552562725943496
Day Actual:  54.18
Day Difference:  -1.6274372740565042
Day Accuracy:  0.9699623980425156

_____
```

```
Day Number 2639 for stock ORCL
Day Forecast:  52.50943786627635
Day Actual:  54.759998
Day Difference:  -2.2505601337236527
Day Accuracy:  0.9589013839313206
_____
Day Number 2640 for stock ORCL
Day Forecast:  52.56167266840821
Day Actual:  55.27
Day Difference:  -2.7083273315917964
Day Accuracy:  0.9509982389797034
_____
Day Number 2641 for stock ORCL
Day Forecast:  52.48722277401727
Day Actual:  55.490002
Day Difference:  -3.002779225982728
Day Accuracy:  0.945886121503785
_____
Day Number 2642 for stock ORCL
Day Forecast:  52.54997019843138
Day Actual:  55.939999
Day Difference:  -3.3900288015686186
Day Accuracy:  0.9393988405046518
_____
Day Number 2643 for stock ORCL
Day Forecast:  52.485330351542316
Day Actual:  56.599998
Day Difference:  -4.114667648457683
Day Accuracy:  0.9273026891545529
_____
Day Number 2644 for stock ORCL
Day Forecast:  52.52128290874439
Day Actual:  56.310001
Day Difference:  -3.7887180912556104
Day Accuracy:  0.9327167816733726
_____
Day Number 2645 for stock ORCL
Day Forecast:  52.49504730019978
Day Actual:  56.66
Day Difference:  -4.164952699800217
Day Accuracy:  0.9264921867313763
_____
Day Number 2646 for stock ORCL
Day Forecast:  52.48751701695444
Day Actual:  57.529999
Day Difference:  -5.042481983045555
Day Accuracy:  0.9123503898714554
_____
Day Number 2647 for stock ORCL
Day Forecast:  52.503255037430606
Day Actual:  57.389999
Day Difference:  -4.886743962569398
Day Accuracy:  0.9148502518257685
_____
Day Number 2648 for stock ORCL
Day Forecast:  52.46104127080231
Day Actual:  57.009998
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Day Difference:  -4.548956729197691
Day Accuracy:  0.9202077374358496

_____

Day Number 2649 for stock ORCL
Day Forecast:  52.50000395606584
Day Actual:  57.200001
Day Difference:  -4.699997043934161
Day Accuracy:  0.9178322209481402

_____

Day Number 2650 for stock ORCL
Day Forecast:  52.448216612023856
Day Actual:  56.619999
Day Difference:  -4.171782387976144
Day Accuracy:  0.9263196315496907

_____

Day Number 2651 for stock ORCL
Day Forecast:  52.48307450735464
Day Actual:  55.82
Day Difference:  -3.3369254926453635
Day Accuracy:  0.9402198944348734

_____

Day Number 2616 for stock AMZN
Day Forecast:  121.19829572933995
Day Actual:  120.519501
Day Difference:  0.6787947293399412
Day Accuracy:  0.9943993046663311

_____

Day Number 2617 for stock AMZN
Day Forecast:  121.23729885269607
Day Actual:  120.055
Day Difference:  1.1822988526960643
Day Accuracy:  0.9902480600946697

_____

Day Number 2618 for stock AMZN
Day Forecast:  121.28143391184844
Day Actual:  122.1185
Day Difference:  -0.837066088151559
Day Accuracy:  0.9931454604490593

_____

Day Number 2619 for stock AMZN
Day Forecast:  121.32517167843385
Day Actual:  123.552002
Day Difference:  -2.2268303215661547
Day Accuracy:  0.9819765743531524

_____

Day Number 2620 for stock AMZN
Day Forecast:  121.3689402017142
Day Actual:  123.620499
Day Difference:  -2.2515587982857994
Day Accuracy:  0.9817865255641316

_____

Day Number 2621 for stock AMZN
Day Forecast:  121.41270634394249
Day Actual:  123.919998
Day Difference:  -2.507291656057518
Day Accuracy:  0.979766852029343

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Day Number 2622 for stock AMZN
Day Forecast:  121.45647267050167
Day Actual:  123.029999
Day Difference:  -1.5735263294983355
Day Accuracy:  0.9872102223661862
_____
Day Number 2623 for stock AMZN
Day Forecast:  121.50023898279075
Day Actual:  124.150002
Day Difference:  -2.649763017209253
Day Accuracy:  0.9786567621866873
_____
Day Number 2624 for stock AMZN
Day Forecast:  121.54400529618455
Day Actual:  126.203003
Day Difference:  -4.658997703815444
Day Accuracy:  0.9630833055231226
_____
Day Number 2625 for stock AMZN
Day Forecast:  121.58777160949283
Day Actual:  130.042999
Day Difference:  -8.455227390507176
Day Accuracy:  0.9349812949906886
_____
Day Number 2626 for stock AMZN
Day Forecast:  121.63153792280774
Day Actual:  132.372498
Day Difference:  -10.74096007719227
Day Accuracy:  0.9188580691648482
_____
Day Number 2627 for stock AMZN
Day Forecast:  121.67530423612213
Day Actual:  127.898003
Day Difference:  -6.222698763877872
Day Accuracy:  0.9513463962070005
_____
Day Number 2628 for stock AMZN
Day Forecast:  121.71907054943655
Day Actual:  127.250999
Day Difference:  -5.531928450563441
Day Accuracy:  0.9565274261574682
_____
Day Number 2629 for stock AMZN
Day Forecast:  121.76283686275097
Day Actual:  128.634003
Day Difference:  -6.871166137249034
Day Accuracy:  0.9465835939409502
_____
Day Number 2630 for stock AMZN
Day Forecast:  121.8066031760654
Day Actual:  130.763504
Day Difference:  -8.956900823934618
Day Accuracy:  0.9315030528400752
_____
Day Number 2631 for stock AMZN
Day Forecast:  121.85036948937982
Day Actual:  132.048996
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Day Difference:  -10.198626510620173
Day Accuracy:  0.9227663456780832


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Day Number 2632 for stock AMZN
Day Forecast:  121.89413580269424
Day Actual:  132.699005
Day Difference:  -10.804869197305763
Day Accuracy:  0.9185761099165306

_____

Day Number 2633 for stock AMZN
Day Forecast:  121.93790211600866
Day Actual:  133.750504
Day Difference:  -11.812601883991348
Day Accuracy:  0.9116818140439206

_____

Day Number 2634 for stock AMZN
Day Forecast:  121.98166842932308
Day Actual:  135.690994
Day Difference:  -13.70932557067691
Day Accuracy:  0.8989665771725652

_____

Day Number 2635 for stock AMZN
Day Forecast:  122.0254347426375
Day Actual:  138.220505
Day Difference:  -16.195070257362502
Day Accuracy:  0.8828316373365696

_____

Day Number 2636 for stock AMZN
Day Forecast:  122.06920105595192
Day Actual:  136.720001
Day Difference:  -14.650799944048075
Day Accuracy:  0.8928408437910407

_____

Day Number 2637 for stock AMZN
Day Forecast:  122.11296736926634
Day Actual:  137.729004
Day Difference:  -15.61603663073366
Day Accuracy:  0.8866176609341221

_____

Day Number 2638 for stock AMZN
Day Forecast:  122.15673368258076
Day Actual:  134.643494
Day Difference:  -12.48676031741924
Day Accuracy:  0.9072605742285681

_____

Day Number 2639 for stock AMZN
Day Forecast:  122.20049999589519
Day Actual:  134.018997
Day Difference:  -11.818497004104827
Day Accuracy:  0.9118147630659792

_____

Day Number 2640 for stock AMZN
Day Forecast:  122.2442663092096
Day Actual:  137.940994
Day Difference:  -15.696727690790382
Day Accuracy:  0.8862069408402959

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Day Number 2641 for stock AMZN
Day Forecast:  122.28803262252403
Day Actual:  143.934998
Day Difference:  -21.64696537747598
Day Accuracy:  0.8496059632593598
_____
Day Number 2642 for stock AMZN
Day Forecast:  122.33179893583845
Day Actual:  144.514999
Day Difference:  -22.18320006416154
Day Accuracy:  0.8464989778385458
_____
Day Number 2643 for stock AMZN
Day Forecast:  122.37556524915287
Day Actual:  152.852005
Day Difference:  -30.47643975084712
Day Accuracy:  0.800614720422888
_____
Day Number 2644 for stock AMZN
Day Forecast:  122.41933156246729
Day Actual:  150.005997
Day Difference:  -27.586665437532716
Day Accuracy:  0.816096249555058
_____
Day Number 2645 for stock AMZN
Day Forecast:  122.46309787578171
Day Actual:  154.055496
Day Difference:  -31.592398124218292
Day Accuracy:  0.7949284579615499
_____
Day Number 2646 for stock AMZN
Day Forecast:  122.50686418909613
Day Actual:  159.1315
Day Difference:  -36.624635810903854
Day Accuracy:  0.7698467254383711
_____
Day Number 2647 for stock AMZN
Day Forecast:  122.55063050241056
Day Actual:  160.0
Day Difference:  -37.449369497589444
Day Accuracy:  0.765941440640066
_____
Day Number 2648 for stock AMZN
Day Forecast:  122.59439681572498
Day Actual:  155.199997
Day Difference:  -32.60560018427502
Day Accuracy:  0.7899123658857092
_____
Day Number 2649 for stock AMZN
Day Forecast:  122.6381631290394
Day Actual:  154.199997
Day Difference:  -31.561833870960598
Day Accuracy:  0.7953188425097012
_____
Day Number 2650 for stock AMZN
Day Forecast:  122.68192944235382
Day Actual:  150.443497
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Day Difference:  -27.761567557646188
Day Accuracy:  0.8154684774600381

_____
Day Number 2651 for stock AMZN
Day Forecast:  122.72569575566824
Day Actual:  149.994995
Day Difference:  -27.269299244331748
Day Accuracy:  0.8181986055979285

_____
Day Number 2616 for stock INTC
Day Forecast:  62.0033025344994
Day Actual:  63.560001
Day Difference:  -1.5566984655006024
Day Accuracy:  0.9755082057739332

_____
Day Number 2617 for stock INTC
Day Forecast:  62.38823285724797
Day Actual:  61.700001
Day Difference:  0.6882318572479704
Day Accuracy:  0.9889685630490171

_____
Day Number 2618 for stock INTC
Day Forecast:  62.02575837988014
Day Actual:  62.93
Day Difference:  -0.904241620119862
Day Accuracy:  0.9856309928472928

_____
Day Number 2619 for stock INTC
Day Forecast:  62.326148324034186
Day Actual:  61.860001
Day Difference:  0.4661473240341891
Day Accuracy:  0.9925208385794886

_____
Day Number 2620 for stock INTC
Day Forecast:  62.09548413599368
Day Actual:  62.119999
Day Difference:  -0.024514864006320636
Day Accuracy:  0.9996053627752582

_____
Day Number 2621 for stock INTC
Day Forecast:  62.26163496211847
Day Actual:  61.93
Day Difference:  0.3316349621184713
Day Accuracy:  0.9946735262843605

_____
Day Number 2622 for stock INTC
Day Forecast:  62.148540312962254
Day Actual:  62.970001
Day Difference:  -0.8214606870377494
Day Accuracy:  0.9869547296491586

_____
Day Number 2623 for stock INTC
Day Forecast:  62.221170488918816
Day Actual:  64.339996
Day Difference:  -2.1188255110811838
Day Accuracy:  0.9670682989927263

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Day Number 2624 for stock INTC
Day Forecast:  62.17752980982993
Day Actual:  63.669998
Day Difference:  -1.4924681901700723
Day Accuracy:  0.976559317778366
_____
Day Number 2625 for stock INTC
Day Forecast:  62.20154453587438
Day Actual:  63.040001
Day Difference:  -0.8384564641256134
Day Accuracy:  0.9866996121379247
_____
Day Number 2626 for stock INTC
Day Forecast:  62.190060879010915
Day Actual:  63.869999
Day Difference:  -1.6799381209890853
Day Accuracy:  0.973697539575833
_____
Day Number 2627 for stock INTC
Day Forecast:  62.19406882339156
Day Actual:  59.700001
Day Difference:  2.4940678233915605
Day Accuracy:  0.9598986226407891
_____
Day Number 2628 for stock INTC
Day Forecast:  62.19413254607151
Day Actual:  59.330002
Day Difference:  2.8641305460715074
Day Accuracy:  0.9539485409825461
_____
Day Number 2629 for stock INTC
Day Forecast:  62.19215786305261
Day Actual:  60.099998
Day Difference:  2.0921598630526077
Day Accuracy:  0.9663597479981391
_____
Day Number 2630 for stock INTC
Day Forecast:  62.19476392841465
Day Actual:  60.400002
Day Difference:  1.7947619284146512
Day Accuracy:  0.9711428773894794
_____
Day Number 2631 for stock INTC
Day Forecast:  62.19221594910122
Day Actual:  60.490002
Day Difference:  1.7022139491012211
Day Accuracy:  0.9726297909935492
_____
Day Number 2632 for stock INTC
Day Forecast:  62.19438871018077
Day Actual:  60.080002
Day Difference:  2.114386710180767
Day Accuracy:  0.9660035775890718
_____
Day Number 2633 for stock INTC
Day Forecast:  62.19268946220356
Day Actual:  59.619999
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Day Difference:  2.5726904622035605
Day Accuracy:  0.9586335550938496

_____
Day Number 2634 for stock INTC
Day Forecast:  62.193933495042224
Day Actual:  60.09
Day Difference:  2.10393349504222
Day Accuracy:  0.9661714032734409

_____
Day Number 2635 for stock INTC
Day Forecast:  62.19307390763441
Day Actual:  59.919998
Day Difference:  2.273075907634407
Day Accuracy:  0.963451301490416

_____
Day Number 2636 for stock INTC
Day Forecast:  62.19363489698402
Day Actual:  59.09
Day Difference:  3.103634896984019
Day Accuracy:  0.9500972261530493

_____
Day Number 2637 for stock INTC
Day Forecast:  62.19329126899263
Day Actual:  58.509998
Day Difference:  3.683293268992628
Day Accuracy:  0.9407766787407665

_____
Day Number 2638 for stock INTC
Day Forecast:  62.19348550867496
Day Actual:  57.5
Day Difference:  4.693485508674961
Day Accuracy:  0.9245341297358178

_____
Day Number 2639 for stock INTC
Day Forecast:  62.19338821682941
Day Actual:  58.27
Day Difference:  3.9233882168294087
Day Accuracy:  0.9369163133040604

_____
Day Number 2640 for stock INTC
Day Forecast:  62.193426519410664
Day Actual:  59.830002
Day Difference:  2.363424519410664
Day Accuracy:  0.9619988051522932

_____
Day Number 2641 for stock INTC
Day Forecast:  62.19342125709316
Day Actual:  58.810001
Day Difference:  3.3834202570931637
Day Accuracy:  0.9455984220082235

_____
Day Number 2642 for stock INTC
Day Forecast:  62.19341022365891
Day Actual:  59.130001
Day Difference:  3.0634092236589083
Day Accuracy:  0.9507438294082552

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Day Number 2643 for stock INTC
Day Forecast:  62.19342743378563
Day Actual:  59.540001
Day Difference:  2.653426433785633
Day Accuracy:  0.9573359027911653

_____
Day Number 2644 for stock INTC
Day Forecast:  62.19340966096295
Day Actual:  58.310001
Day Difference:  3.8834086609629495
Day Accuracy:  0.9375591612980747

_____
Day Number 2645 for stock INTC
Day Forecast:  62.193425272855094
Day Actual:  58.610001
Day Difference:  3.5834242728550976
Day Accuracy:  0.9423825869513716

_____
Day Number 2646 for stock INTC
Day Forecast:  62.19341281099677
Day Actual:  58.419998
Day Difference:  3.773414810996769
Day Accuracy:  0.9393277416297443

_____
Day Number 2647 for stock INTC
Day Forecast:  62.193422086513074
Day Actual:  59.529999
Day Difference:  2.6634230865130775
Day Accuracy:  0.9571751642350831

_____
Day Number 2648 for stock INTC
Day Forecast:  62.19341557947953
Day Actual:  58.580002
Day Difference:  3.613413579479527
Day Accuracy:  0.9419003837333585

_____
Day Number 2649 for stock INTC
Day Forecast:  62.19341989297107
Day Actual:  58.98
Day Difference:  3.213419892971075
Day Accuracy:  0.9483318348066232

_____
Day Number 2650 for stock INTC
Day Forecast:  62.19341720250907
Day Actual:  59.029999
Day Difference:  3.163418202509071
Day Accuracy:  0.9491358033566702

_____
Day Number 2651 for stock INTC
Day Forecast:  62.1934187604838
Day Actual:  59.139999
Day Difference:  3.0534197604837985
Day Accuracy:  0.950904455 4658914

_____
Day Number 2616 for stock MSFT
Day Forecast:  182.27706554779024
Day Actual:  181.809998
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Day Difference:  0.46706764779023047
Day Accuracy:  0.9974375950911305

_____
Day Number 2617 for stock MSFT
Day Forecast:  182.1238510341651
Day Actual:  181.399994
Day Difference:  0.7238570341651211
Day Accuracy:  0.996025468218167

_____
Day Number 2618 for stock MSFT
Day Forecast:  182.25021973839503
Day Actual:  183.25
Day Difference:  -0.9997802616049682
Day Accuracy:  0.9945441731972444

_____
Day Number 2619 for stock MSFT
Day Forecast:  182.2857256492211
Day Actual:  182.830002
Day Difference:  -0.5442763507789152
Day Accuracy:  0.9970230468477547

_____
Day Number 2620 for stock MSFT
Day Forecast:  182.35076138782262
Day Actual:  184.910004
Day Difference:  -2.5592426121773713
Day Accuracy:  0.9861595232447382

_____
Day Number 2621 for stock MSFT
Day Forecast:  182.40620012091966
Day Actual:  185.360001
Day Difference:  -2.9538008790803474
Day Accuracy:  0.9840645184336164

_____
Day Number 2622 for stock MSFT
Day Forecast:  182.46475781953706
Day Actual:  182.919998
Day Difference:  -0.4552401804629369
Day Accuracy:  0.9975112607399934

_____
Day Number 2623 for stock MSFT
Day Forecast:  182.52230187427224
Day Actual:  187.199997
Day Difference:  -4.677695125727752
Day Accuracy:  0.9750123119621217

_____
Day Number 2624 for stock MSFT
Day Forecast:  182.5801753567979
Day Actual:  188.360001
Day Difference:  -5.779825643202116
Day Accuracy:  0.9693150052425297

_____
Day Number 2625 for stock MSFT
Day Forecast:  182.63794177739476
Day Actual:  189.800003
Day Difference:  -7.162061222605246
Day Accuracy:  0.9622652207091628

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Day Number 2626 for stock MSFT
Day Forecast:  182.695742992435
Day Actual:  196.839996
Day Difference:  -14.144253007565027
Day Accuracy:  0.928143399232923
_____
Day Number 2627 for stock MSFT
Day Forecast:  182.75353289950326
Day Actual:  186.270004
Day Difference:  -3.5164711004967444
Day Accuracy:  0.9811216458636209
_____
Day Number 2628 for stock MSFT
Day Forecast:  182.8113264815902
Day Actual:  187.740005
Day Difference:  -4.928678518409782
Day Accuracy:  0.9737473187006159
_____
Day Number 2629 for stock MSFT
Day Forecast:  182.86911886931955
Day Actual:  188.940002
Day Difference:  -6.070883130680443
Day Accuracy:  0.9678687251698005
_____
Day Number 2630 for stock MSFT
Day Forecast:  182.9269116452075
Day Actual:  193.570007
Day Difference:  -10.643095354792507
Day Accuracy:  0.945016815777702
_____
Day Number 2631 for stock MSFT
Day Forecast:  182.98470429494637
Day Actual:  194.240005
Day Difference:  -11.255300705053628
Day Accuracy:  0.942054672491109
_____
Day Number 2632 for stock MSFT
Day Forecast:  183.0424969856829
Day Actual:  196.320007
Day Difference:  -13.277510014317102
Day Accuracy:  0.9323680239359552
_____
Day Number 2633 for stock MSFT
Day Forecast:  183.10028966309545
Day Actual:  195.149994
Day Difference:  -12.04970433690454
Day Accuracy:  0.938254139342146
_____
Day Number 2634 for stock MSFT
Day Forecast:  183.15808234483822
Day Actual:  200.570007
Day Difference:  -17.411924655161783
Day Accuracy:  0.913187794548156
_____
Day Number 2635 for stock MSFT
Day Forecast:  183.2158750251737
Day Actual:  201.910004
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Day Difference:  -18.6941289748263
Day Accuracy:  0.9074135575034395

_____

Day Number 2636 for stock MSFT
Day Forecast:  183.27366770596652
Day Actual:  197.839996
Day Difference:  -14.566328294033497
Day Accuracy:  0.926373187482103

_____

Day Number 2637 for stock MSFT
Day Forecast:  183.3314603866107
Day Actual:  200.339996
Day Difference:  -17.008535613389313
Day Accuracy:  0.915016474344478

_____

Day Number 2638 for stock MSFT
Day Forecast:  183.3892530673032
Day Actual:  196.330002
Day Difference:  -12.940748932696806
Day Accuracy:  0.9340867478181109

_____

Day Number 2639 for stock MSFT
Day Forecast:  183.44704574797998
Day Actual:  198.440002
Day Difference:  -14.992956252020008
Day Accuracy:  0.9244458974959091

_____

Day Number 2640 for stock MSFT
Day Forecast:  183.50483842866188
Day Actual:  203.509995
Day Difference:  -20.00515657133812
Day Accuracy:  0.9016993903845454

_____

Day Number 2641 for stock MSFT
Day Forecast:  183.56263110934214
Day Actual:  204.699997
Day Difference:  -21.13736589065786
Day Accuracy:  0.8967397840721129

_____

Day Number 2642 for stock MSFT
Day Forecast:  183.62042379002293
Day Actual:  206.259995
Day Difference:  -22.639571209977078
Day Accuracy:  0.8902377011597568

_____

Day Number 2643 for stock MSFT
Day Forecast:  183.67821647070352
Day Actual:  210.699997
Day Difference:  -27.02178052929648
Day Accuracy:  0.8717523449737093

_____

Day Number 2644 for stock MSFT
Day Forecast:  183.73600915138417
Day Actual:  208.25
Day Difference:  -24.513990848615833
Day Accuracy:  0.8822857582299359

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Day Number 2645 for stock MSFT
Day Forecast:  183.79380183206482
Day Actual:  212.830002
Day Difference:  -29.036200167935192
Day Accuracy:  0.8635709256445189

_____
Day Number 2646 for stock MSFT
Day Forecast:  183.85159451274546
Day Actual:  214.320007
Day Difference:  -30.46841248725454
Day Accuracy:  0.857836825811346

_____
Day Number 2647 for stock MSFT
Day Forecast:  183.9093871934261
Day Actual:  213.669998
Day Difference:  -29.76061080657388
Day Accuracy:  0.8607169416149202

_____
Day Number 2648 for stock MSFT
Day Forecast:  183.96717987410676
Day Actual:  207.070007
Day Difference:  -23.102827125893242
Day Accuracy:  0.8884298722900356

_____
Day Number 2649 for stock MSFT
Day Forecast:  184.0249725547874
Day Actual:  208.350006
Day Difference:  -24.325033445212597
Day Accuracy:  0.883249182907718

_____
Day Number 2650 for stock MSFT
Day Forecast:  184.08276523546806
Day Actual:  208.039993
Day Difference:  -23.95722776453195
Day Accuracy:  0.884843162031195

_____
Day Number 2651 for stock MSFT
Day Forecast:  184.1405579161487
Day Actual:  203.919998
Day Difference:  -19.779440083851284
Day Accuracy:  0.903039217445889

_____
Day Number 2616 for stock NVDA
Day Forecast:  87.725106182897
Day Actual:  85.252502
Day Difference:  2.472604182896987
Day Accuracy:  0.9718141785118859

_____
Day Number 2617 for stock NVDA
Day Forecast:  87.64285939866984
Day Actual:  84.870003
Day Difference:  2.7728563986698447
Day Accuracy:  0.9683618674961679

_____
Day Number 2618 for stock NVDA
Day Forecast:  87.28283294419047
Day Actual:  88.754997
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Day Difference:  -1.4721640558095288
Day Accuracy:  0.9834131698994985

_____

Day Number 2619 for stock NVDA
Day Forecast:  87.77062547899665
Day Actual:  88.0625
Day Difference:  -0.29187452100335065
Day Accuracy:  0.9966855980581593

_____

Day Number 2620 for stock NVDA
Day Forecast:  87.34600120747616
Day Actual:  88.252502
Day Difference:  -0.9065007925238433
Day Accuracy:  0.9897283275603468

_____

Day Number 2621 for stock NVDA
Day Forecast:  87.75275404540689
Day Actual:  87.695
Day Difference:  0.057754045406895216
Day Accuracy:  0.9993418548963487

_____

Day Number 2622 for stock NVDA
Day Forecast:  87.49713532053347
Day Actual:  87.665001
Day Difference:  -0.16786567946653008
Day Accuracy:  0.9980851459812733

_____

Day Number 2623 for stock NVDA
Day Forecast:  87.73167758447929
Day Actual:  89.199997
Day Difference:  -1.4683194155207104
Day Accuracy:  0.9835390194517528

_____

Day Number 2624 for stock NVDA
Day Forecast:  87.62841204466824
Day Actual:  88.050003
Day Difference:  -0.4215909553317658
Day Accuracy:  0.9952119143558489

_____

Day Number 2625 for stock NVDA
Day Forecast:  87.74374151052129
Day Actual:  90.459999
Day Difference:  -2.716257489478707
Day Accuracy:  0.9699728330808548

_____

Day Number 2626 for stock NVDA
Day Forecast:  87.72742132684215
Day Actual:  93.667503
Day Difference:  -5.940081673157849
Day Accuracy:  0.9365833241742566

_____

Day Number 2627 for stock NVDA
Day Forecast:  87.78360715243278
Day Actual:  87.962502
Day Difference:  -0.1788948475672214
Day Accuracy:  0.997966237390937

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Day Number 2628 for stock NVDA
Day Forecast:  87.80504225293213
Day Actual:  89.324997
Day Difference:  -1.519954747067871
Day Accuracy:  0.9829839933040483
_____
Day Number 2629 for stock NVDA
Day Forecast:  87.83885368292974
Day Actual:  91.737503
Day Difference:  -3.898649317070266
Day Accuracy:  0.9575021208385162
_____
Day Number 2630 for stock NVDA
Day Forecast:  87.87233578599634
Day Actual:  90.684998
Day Difference:  -2.8126622140036517
Day Accuracy:  0.9689842611673912
_____
Day Number 2631 for stock NVDA
Day Forecast:  87.90060181382758
Day Actual:  92.360001
Day Difference:  -4.459399186172419
Day Accuracy:  0.9517172029245385
_____
Day Number 2632 for stock NVDA
Day Forecast:  87.93584140534448
Day Actual:  92.18
Day Difference:  -4.244158594655531
Day Accuracy:  0.9539579236856636
_____
Day Number 2633 for stock NVDA
Day Forecast:  87.96433938836138
Day Actual:  92.612503
Day Difference:  -4.648163611638623
Day Accuracy:  0.9498106253359914
_____
Day Number 2634 for stock NVDA
Day Forecast:  87.99847371059393
Day Actual:  95.267502
Day Difference:  -7.269028289406066
Day Accuracy:  0.9236987625706186
_____
Day Number 2635 for stock NVDA
Day Forecast:  88.02831166657376
Day Actual:  94.5
Day Difference:  -6.471688333426243
Day Accuracy:  0.9315165255722091
_____
Day Number 2636 for stock NVDA
Day Forecast:  88.06119758476567
Day Actual:  92.355003
Day Difference:  -4.293805415234331
Day Accuracy:  0.9535076035324872
_____
Day Number 2637 for stock NVDA
Day Forecast:  88.09205708707508
Day Actual:  94.900002
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Day Difference:  -6.807944912924924
Day Accuracy:  0.928261909700224

_____

Day Number 2638 for stock NVDA
Day Forecast:  88.12417642818895
Day Actual:  91.550003
Day Difference:  -3.425826571811058
Day Accuracy:  0.9625797219055137

_____

Day Number 2639 for stock NVDA
Day Forecast:  88.15557251282195
Day Actual:  92.0
Day Difference:  -3.844427487178052
Day Accuracy:  0.9582127447045864

_____

Day Number 2640 for stock NVDA
Day Forecast:  88.18733977369345
Day Actual:  94.977501
Day Difference:  -6.790161226306552
Day Accuracy:  0.9285076870330948

_____

Day Number 2641 for stock NVDA
Day Forecast:  88.21895154909696
Day Actual:  95.300003
Day Difference:  -7.081051450903047
Day Accuracy:  0.9256972588877773

_____

Day Number 2642 for stock NVDA
Day Forecast:  88.25059733378464
Day Actual:  96.122498
Day Difference:  -7.871900666215353
Day Accuracy:  0.9181055337719651

_____

Day Number 2643 for stock NVDA
Day Forecast:  88.28226958379648
Day Actual:  98.392502
Day Difference:  -10.110232416203516
Day Accuracy:  0.8972459058292519

_____

Day Number 2644 for stock NVDA
Day Forecast:  88.31389169592472
Day Actual:  98.717499
Day Difference:  -10.40360730407528
Day Accuracy:  0.8946123290251177

_____

Day Number 2645 for stock NVDA
Day Forecast:  88.34556731528617
Day Actual:  102.160004
Day Difference:  -13.814436684713826
Day Accuracy:  0.8647764668772544

_____

Day Number 2646 for stock NVDA
Day Forecast:  88.37719582244733
Day Actual:  105.089996
Day Difference:  -16.712800177552666
Day Accuracy:  0.8409667826274095

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Day Number 2647 for stock NVDA
Day Forecast:  88.40886153911697
Day Actual:  104.792503
Day Difference:  -16.383641460883027
Day Accuracy:  0.8436563590729097
_____
Day Number 2648 for stock NVDA
Day Forecast:  88.44050008151018
Day Actual:  100.522499
Day Difference:  -12.081998918489816
Day Accuracy:  0.879808012746581
_____
Day Number 2649 for stock NVDA
Day Forecast:  88.47215719020917
Day Actual:  103.769997
Day Difference:  -15.29783980979083
Day Accuracy:  0.8525793557670545
_____
Day Number 2650 for stock NVDA
Day Forecast:  88.50380241312891
Day Actual:  102.272499
Day Difference:  -13.768696586871087
Day Accuracy:  0.8653724439952222
_____
Day Number 2651 for stock NVDA
Day Forecast:  88.53545471124418
Day Actual:  101.347504
Day Difference:  -12.812049288755816
Day Accuracy:  0.8735829814934977
_____
Day Number 2616 for stock IBM
Day Forecast:  116.405357
Day Actual:  120.019119
Day Difference:  -3.6137620000000084
Day Accuracy:  0.9698901139242656
_____
Day Number 2617 for stock IBM
Day Forecast:  116.405357
Day Actual:  119.053535
Day Difference:  -2.6481780000000015
Day Accuracy:  0.9777564101729529
_____
Day Number 2618 for stock IBM
Day Forecast:  116.405357
Day Actual:  119.407265
Day Difference:  -3.0019080000000002
Day Accuracy:  0.9748599216303966
_____
Day Number 2619 for stock IBM
Day Forecast:  116.405357
Day Actual:  119.397705
Day Difference:  -2.992348000000007
Day Accuracy:  0.9749379772416898
_____
Day Number 2620 for stock IBM
Day Forecast:  116.405357
Day Actual:  120.458893
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Day Difference:  -4.053536000000008
Day Accuracy:  0.9663492175708438

_____
Day Number 2621 for stock IBM
Day Forecast:  116.405357
Day Actual:  123.374763
Day Difference:  -6.969406000000006
Day Accuracy:  0.9435102785161986

_____
Day Number 2622 for stock IBM
Day Forecast:  116.405357
Day Actual:  123.221794
Day Difference:  -6.816437000000008
Day Accuracy:  0.9446815633929173

_____
Day Number 2623 for stock IBM
Day Forecast:  116.405357
Day Actual:  126.252388
Day Difference:  -9.847031000000001
Day Accuracy:  0.9220051901117308

_____
Day Number 2624 for stock IBM
Day Forecast:  116.405357
Day Actual:  129.780121
Day Difference:  -13.374764000000013
Day Accuracy:  0.8969428915850679

_____
Day Number 2625 for stock IBM
Day Forecast:  116.405357
Day Actual:  126.070747
Day Difference:  -9.665390000000002
Day Accuracy:  0.9233336025208132

_____
Day Number 2626 for stock IBM
Day Forecast:  116.405357
Day Actual:  124.158699
Day Difference:  -7.753420000000035
Day Accuracy:  0.9375529700097776

_____
Day Number 2627 for stock IBM
Day Forecast:  116.405357
Day Actual:  112.820267
Day Difference:  3.585089999999994
Day Accuracy:  0.9692016751428373

_____
Day Number 2628 for stock IBM
Day Forecast:  116.405357
Day Actual:  116.548759
Day Difference:  -0.1434020000000089
Day Accuracy:  0.9987695965085307

_____
Day Number 2629 for stock IBM
Day Forecast:  116.405357
Day Actual:  116.300194
Day Difference:  0.10516299999999035
Day Accuracy:  0.9990965793782155

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Day Number 2630 for stock IBM
Day Forecast:  116.405357
Day Actual:  119.646271
Day Difference:  -3.2409140000000036
Day Accuracy:  0.9729125364884962
_____
Day Number 2631 for stock IBM
Day Forecast:  116.405357
Day Actual:  118.690247
Day Difference:  -2.2848900000000043
Day Accuracy:  0.9807491343412572
_____
Day Number 2632 for stock IBM
Day Forecast:  116.405357
Day Actual:  118.699806
Day Difference:  -2.294449
Day Accuracy:  0.9806701537490297
_____
Day Number 2633 for stock IBM
Day Forecast:  116.405357
Day Actual:  117.084129
Day Difference:  -0.6787720000000093
Day Accuracy:  0.9942026984716262
_____
Day Number 2634 for stock IBM
Day Forecast:  116.405357
Day Actual:  115.745697
Day Difference:  0.6596599999999881
Day Accuracy:  0.9943330786743776
_____
Day Number 2635 for stock IBM
Day Forecast:  116.405357
Day Actual:  114.158699
Day Difference:  2.2466579999999965
Day Accuracy:  0.9806997026777728
_____
Day Number 2636 for stock IBM
Day Forecast:  116.405357
Day Actual:  111.300194
Day Difference:  5.10516299999999
Day Accuracy:  0.9561432297312572
_____
Day Number 2637 for stock IBM
Day Forecast:  116.405357
Day Actual:  113.79541
Day Difference:  2.609946999999991
Day Accuracy:  0.9775788067897941
_____
Day Number 2638 for stock IBM
Day Forecast:  116.405357
Day Actual:  112.036331
Day Difference:  4.369025999999991
Day Accuracy:  0.9624671397210698
_____
Day Number 2639 for stock IBM
Day Forecast:  116.405357
Day Actual:  114.483749
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Day Difference:  1.921607999999992
Day Accuracy:  0.9834920999383217

_____
Day Number 2640 for stock IBM
Day Forecast:  116.405357
Day Actual:  115.458893
Day Difference:  0.9464639999999918
Day Accuracy:  0.9918692401759484

_____
Day Number 2641 for stock IBM
Day Forecast:  116.405357
Day Actual:  113.326958
Day Difference:  3.0783989999999903
Day Accuracy:  0.9735544902800307

_____
Day Number 2642 for stock IBM
Day Forecast:  116.405357
Day Actual:  114.435944
Day Difference:  1.9694129999999888
Day Accuracy:  0.983081422962347l

_____
Day Number 2643 for stock IBM
Day Forecast:  116.405357
Day Actual:  114.904396
Day Difference:  1.5009609999999896
Day Accuracy:  0.9871057394721104

_____
Day Number 2644 for stock IBM
Day Forecast:  116.405357
Day Actual:  112.40918
Day Difference:  3.9961769999999888
Day Accuracy:  0.9656701624135735

_____
Day Number 2645 for stock IBM
Day Forecast:  116.405357
Day Actual:  112.533463
Day Difference:  3.8718939999999975
Day Accuracy:  0.966737836644408

_____
Day Number 2646 for stock IBM
Day Forecast:  116.405357
Day Actual:  110.621414
Day Difference:  5.783942999999994
Day Accuracy:  0.9503120547965848

_____
Day Number 2647 for stock IBM
Day Forecast:  116.405357
Day Actual:  113.145317
Day Difference:  3.2600399999999894
Day Accuracy:  0.9719940724033861

_____
Day Number 2648 for stock IBM
Day Forecast:  116.405357
Day Actual:  113.957932
Day Difference:  2.4474249999999955
Day Accuracy:  0.9789749796480587

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```
Day Number 2649 for stock IBM
Day Forecast:  116.405357
Day Actual:  115.296364
Day Difference:  1.1089929999999981
Day Accuracy:  0.9904730071829941

_____
Day Number 2650 for stock IBM
Day Forecast:  116.405357
Day Actual:  117.59082
Day Difference:  -1.1854629999999986
Day Accuracy:  0.9899187453578434

_____
Day Number 2651 for stock IBM
Day Forecast:  116.405357
Day Actual:  118.556404
Day Difference:  -2.1510470000000055
Day Accuracy:  0.9818563407169468

_____
Day Number 2616 for stock NFLX
Day Forecast:  414.66717740355665
Day Actual:  419.890015
Day Difference:  -5.222837596443355
Day Accuracy:  0.9875614151090415

_____
Day Number 2617 for stock NFLX
Day Forecast:  413.40826546698764
Day Actual:  413.440002
Day Difference:  -0.031736533012349355
Day Accuracy:  0.9999232378752447

_____
Day Number 2618 for stock NFLX
Day Forecast:  412.791328760214
Day Actual:  419.730011
Day Difference:  -6.938682239785976
Day Accuracy:  0.9834687011699386

_____
Day Number 2619 for stock NFLX
Day Forecast:  412.8799466995857
Day Actual:  425.920013
Day Difference:  -13.04006630041431
Day Accuracy:  0.9693837671337263

_____
Day Number 2620 for stock NFLX
Day Forecast:  412.90420249580876
Day Actual:  427.309998
Day Difference:  -14.405795504191246
Day Accuracy:  0.9662872491361851

_____
Day Number 2621 for stock NFLX
Day Forecast:  413.01822316288093
Day Actual:  421.970001
Day Difference:  -8.951777837119096
Day Accuracy:  0.9787857482382519

_____
Day Number 2622 for stock NFLX
Day Forecast:  413.16258568443726
Day Actual:  414.329987
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Day Difference:  -1.1674013155627563
Day Accuracy:  0.9971824358550163

_____

Day Number 2623 for stock NFLX
Day Forecast:  413.30767504404025
Day Actual:  419.600006
Day Difference:  -6.292330955959756
Day Accuracy:  0.9850039779171029

_____

Day Number 2624 for stock NFLX
Day Forecast:  413.459962120173
Day Actual:  419.48999
Day Difference:  -6.030027879827003
Day Accuracy:  0.9856253354702766

_____

Day Number 2625 for stock NFLX
Day Forecast:  413.61359388341066
Day Actual:  434.049988
Day Difference:  -20.436394116589327
Day Accuracy:  0.9529169573054121

_____

Day Number 2626 for stock NFLX
Day Forecast:  413.767686665075
Day Actual:  434.480011
Day Difference:  -20.712324334924972
Day Accuracy:  0.9523284758549572

_____

Day Number 2627 for stock NFLX
Day Forecast:  413.92225618131636
Day Actual:  425.559998
Day Difference:  -11.63774181868365
Day Accuracy:  0.9726531114922046

_____

Day Number 2628 for stock NFLX
Day Forecast:  414.07690554540176
Day Actual:  418.070007
Day Difference:  -3.993101454598218
Day Accuracy:  0.9904487253624051

_____

Day Number 2629 for stock NFLX
Day Forecast:  414.23160959244916
Day Actual:  425.5
Day Difference:  -11.26839040755084
Day Accuracy:  0.973517296339481

_____

Day Number 2630 for stock NFLX
Day Forecast:  414.3863430998184
Day Actual:  436.130005
Day Difference:  -21.743661900181564
Day Accuracy:  0.9501440816937565

_____

Day Number 2631 for stock NFLX
Day Forecast:  414.54108318115095
Day Actual:  447.769989
Day Difference:  -33.22890581884906
Day Accuracy:  0.9257902346402026

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Day Number 2632 for stock NFLX
Day Forecast:  414.69582803792787
Day Actual:  449.869995
Day Difference:  -35.17416696207215
Day Accuracy:  0.9218125961877672
_____
Day Number 2633 for stock NFLX
Day Forecast:  414.8505747442906
Day Actual:  453.720001
Day Difference:  -38.86942625570941
Day Accuracy:  0.9143316887727209
_____
Day Number 2634 for stock NFLX
Day Forecast:  415.0053220460858
Day Actual:  468.040009
Day Difference:  -53.03468695391422
Day Accuracy:  0.8866877063197514
_____
Day Number 2635 for stock NFLX
Day Forecast:  415.1600697132247
Day Actual:  466.26001
Day Difference:  -51.099940286775336
Day Accuracy:  0.8904046257649775
_____
Day Number 2636 for stock NFLX
Day Forecast:  415.3148175052172
Day Actual:  457.850006
Day Difference:  -42.5351884947828
Day Accuracy:  0.9070979841927035
_____
Day Number 2637 for stock NFLX
Day Forecast:  415.46956534906263
Day Actual:  465.910004
Day Difference:  -50.44043865093738
Day Accuracy:  0.8917378072634444
_____
Day Number 2638 for stock NFLX
Day Forecast:  415.62431321931405
Day Actual:  443.399994
Day Difference:  -27.775680780685946
Day Accuracy:  0.9373575075405032
_____
Day Number 2639 for stock NFLX
Day Forecast:  415.7790610986995
Day Actual:  447.23999
Day Difference:  -31.460928901300463
Day Accuracy:  0.9296553760738157
_____
Day Number 2640 for stock NFLX
Day Forecast:  415.9338089823297
Day Actual:  455.040009
Day Difference:  -39.10620001767029
Day Accuracy:  0.9140598645301312
_____
Day Number 2641 for stock NFLX
Day Forecast:  416.0885568678458
Day Actual:  485.640015
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Day Difference:  -69.55145813215421
Day Accuracy:  0.8567839222800572

_____

Day Number 2642 for stock NFLX
Day Forecast:  416.24330475406435
Day Actual:  476.890015
Day Difference:  -60.64671024593565
Day Accuracy:  0.872828727089336

_____

Day Number 2643 for stock NFLX
Day Forecast:  416.39805264061397
Day Actual:  493.809998
Day Difference:  -77.41194535938604
Day Accuracy:  0.8432353624411913

_____

Day Number 2644 for stock NFLX
Day Forecast:  416.55280052730006
Day Actual:  493.160004
Day Difference:  -76.60720347269995
Day Accuracy:  0.8446605506299332

_____

Day Number 2645 for stock NFLX
Day Forecast:  416.707548414041
Day Actual:  502.779999
Day Difference:  -86.07245058595896
Day Accuracy:  0.8288069319440868

_____

Day Number 2646 for stock NFLX
Day Forecast:  416.86229630080703
Day Actual:  507.76001
Day Difference:  -90.89771369919299
Day Accuracy:  0.8209829212442449

_____

Day Number 2647 for stock NFLX
Day Forecast:  417.01704418758317
Day Actual:  548.72998
Day Difference:  -131.7129358124168
Day Accuracy:  0.7599676696862512

_____

Day Number 2648 for stock NFLX
Day Forecast:  417.17179207436357
Day Actual:  525.5
Day Difference:  -108.32820792563643
Day Accuracy:  0.7938568831101115

_____

Day Number 2649 for stock NFLX
Day Forecast:  417.32653996114584
Day Actual:  524.880005
Day Difference:  -107.55346503885414
Day Accuracy:  0.7950894223169082

_____

Day Number 2650 for stock NFLX
Day Forecast:  417.48128784792885
Day Actual:  523.26001
Day Difference:  -105.77872215207111
Day Accuracy:  0.7978467298655766

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Day Number 2651 for stock NFLX
Day Forecast:  417.6360357347122
Day Actual:  527.390015
Day Difference:  -109.75397926528774
Day Accuracy:  0.7918921933603772
_____
Day Number 2616 for stock GOOGL
Day Forecast:  70.72562598809797
Day Actual:  71.014
Day Difference:  -0.2883740119020217
Day Accuracy:  0.9959391949206914
_____
Day Number 2617 for stock GOOGL
Day Forecast:  71.0374873739506
Day Actual:  70.912003
Day Difference:  0.12548437395059864
Day Accuracy:  0.9982335471229432
_____
Day Number 2618 for stock GOOGL
Day Forecast:  70.78318840635588
Day Actual:  71.676003
Day Difference:  -0.8928145936441183
Day Accuracy:  0.9875437446805716
_____
Day Number 2619 for stock GOOGL
Day Forecast:  70.92525322639739
Day Actual:  71.7435
Day Difference:  -0.8182467736026098
Day Accuracy:  0.9885948305616173
_____
Day Number 2620 for stock GOOGL
Day Forecast:  70.88896944111545
Day Actual:  72.115501
Day Difference:  -1.2265315588845453
Day Accuracy:  0.9829921231652464
_____
Day Number 2621 for stock GOOGL
Day Forecast:  70.80268710347019
Day Actual:  71.962502
Day Difference:  -1.1598148965298094
Day Accuracy:  0.983883065981644
_____
Day Number 2622 for stock GOOGL
Day Forecast:  70.96862956273094
Day Actual:  70.714996
Day Difference:  0.25363356273093984
Day Accuracy:  0.9964261172254039
_____
Day Number 2623 for stock GOOGL
Day Forecast:  70.73570045447042
Day Actual:  72.000999
Day Difference:  -1.2652985455295749
Day Accuracy:  0.9824266529200577
_____
Day Number 2624 for stock GOOGL
Day Forecast:  70.97429270721646
Day Actual:  72.402
```

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Day Difference:  -1.4277072927835377
Day Accuracy:  0.9802808307397097

_____

Day Number 2625 for stock GOOGL
Day Forecast:  70.7481113900039
Day Actual:  72.603996
Day Difference:  -1.855884609996096
Day Accuracy:  0.9744382580540595

_____

Day Number 2626 for stock GOOGL
Day Forecast:  70.90798452452339
Day Actual:  73.235001
Day Difference:  -2.3270164754766114
Day Accuracy:  0.9682253506697349

_____

Day Number 2627 for stock GOOGL
Day Forecast:  70.81444013296367
Day Actual:  70.095001
Day Difference:  0.7194391329636716
Day Accuracy:  0.989840502422771

_____

Day Number 2628 for stock GOOGL
Day Forecast:  70.81278169249016
Day Actual:  70.646004
Day Difference:  0.1667776924901574
Day Accuracy:  0.9976448080628381

_____

Day Number 2629 for stock GOOGL
Day Forecast:  70.88214584854855
Day Actual:  71.037003
Day Difference:  -0.15485715145145207
Day Accuracy:  0.9978200494825007

_____

Day Number 2630 for stock GOOGL
Day Forecast:  70.74173239077575
Day Actual:  72.323502
Day Difference:  -1.5817696092242528
Day Accuracy:  0.97812924477545

_____

Day Number 2631 for stock GOOGL
Day Forecast:  70.90599032300355
Day Actual:  72.626999
Day Difference:  -1.7210086769964477
Day Accuracy:  0.9763034587592357

_____

Day Number 2632 for stock GOOGL
Day Forecast:  70.72583341459479
Day Actual:  71.706001
Day Difference:  -0.9801675854052121
Day Accuracy:  0.9863307453806383

_____

Day Number 2633 for stock GOOGL
Day Forecast:  70.87291164513375
Day Actual:  71.232002
Day Difference:  -0.35909035486623964
Day Accuracy:  0.9949588619611416

_____
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```
Day Number 2634 for stock GOOGL
Day Forecast:  70.75961288143863
Day Actual:  72.532997
Day Difference:  -1.773384118561367
Day Accuracy:  0.9755506570539011
_____
Day Number 2635 for stock GOOGL
Day Forecast:  70.80457469304613
Day Actual:  73.198997
Day Difference:  -2.394422306953871
Day Accuracy:  0.9672888645324762
_____
Day Number 2636 for stock GOOGL
Day Forecast:  70.80989233801284
Day Actual:  71.635002
Day Difference:  -0.8251096619871561
Day Accuracy:  0.9884817527891302
_____
Day Number 2637 for stock GOOGL
Day Forecast:  70.73957117548412
Day Actual:  72.055
Day Difference:  -1.315428824515891
Day Accuracy:  0.9817441006936939
_____
Day Number 2638 for stock GOOGL
Day Forecast:  70.83912225380169
Day Actual:  68.126999
Day Difference:  2.7121232538016926
Day Accuracy:  0.9617143300550122
_____
Day Number 2639 for stock GOOGL
Day Forecast:  70.708633566496
Day Actual:  69.858498
Day Difference:  0.8501355664960073
Day Accuracy:  0.9879769198807028
_____
Day Number 2640 for stock GOOGL
Day Forecast:  70.82763513581156
Day Actual:  70.902496
Day Difference:  -0.0748608641884374
Day Accuracy:  0.9989441716665597
_____
Day Number 2641 for stock GOOGL
Day Forecast:  70.71818365080298
Day Actual:  72.099998
Day Difference:  -1.3818143491970147
Day Accuracy:  0.9808347519066919
_____
Day Number 2642 for stock GOOGL
Day Forecast:  70.78219405867114
Day Actual:  73.496498
Day Difference:  -2.7143039413288648
Day Accuracy:  0.9630689350487303
_____
Day Number 2643 for stock GOOGL
Day Forecast:  70.7503865679189
Day Actual:  74.982498
```

```
Day Difference:  -4.232111432081112
Day Accuracy:  0.9435586764249824

_____

Day Number 2644 for stock GOOGL
Day Forecast:  70.72803471155223
Day Actual:  74.496002
Day Difference:  -3.767967288447778
Day Accuracy:  0.9494205435555082

_____

Day Number 2645 for stock GOOGL
Day Forecast:  70.77713689482684
Day Actual:  75.18
Day Difference:  -4.402863105173168
Day Accuracy:  0.9414357128867629

_____

Day Number 2646 for stock GOOGL
Day Forecast:  70.69151697275683
Day Actual:  75.932999
Day Difference:  -5.2414820272431655
Day Accuracy:  0.9309722769247772

_____

Day Number 2647 for stock GOOGL
Day Forecast:  70.77779292399325
Day Actual:  76.9505
Day Difference:  -6.172707076006759
Day Accuracy:  0.9197834052279483

_____

Day Number 2648 for stock GOOGL
Day Forecast:  70.68480264949281
Day Actual:  75.611504
Day Difference:  -4.926701350507187
Day Accuracy:  0.9348419077802342

_____

Day Number 2649 for stock GOOGL
Day Forecast:  70.74988984867127
Day Actual:  76.042999
Day Difference:  -5.293109151328721
Day Accuracy:  0.930393208830063

_____

Day Number 2650 for stock GOOGL
Day Forecast:  70.70105303202264
Day Actual:  75.844002
Day Difference:  -5.142948967977361
Day Accuracy:  0.9321904325673985

_____

Day Number 2651 for stock GOOGL
Day Forecast:  70.70775644132252
Day Actual:  75.746002
Day Difference:  -5.038245558677488
Day Accuracy:  0.9334849968889779

_____

Day Number 2616 for stock CRM
Day Forecast:  177.1308112577424
Day Actual:  176.600006
Day Difference:  0.5308052577424007
Day Accuracy:  0.9970033149288182

_____
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```
Day Number 2617 for stock CRM
Day Forecast:  176.7956183244601
Day Actual:  181.100006
Day Difference:  -4.304387675539914
Day Accuracy:  0.9762319849092665
_____
Day Number 2618 for stock CRM
Day Forecast:  177.0472167509282
Day Actual:  174.789993
Day Difference:  2.2572237509281763
Day Accuracy:  0.9872507244544619
_____
Day Number 2619 for stock CRM
Day Forecast:  177.13414269567988
Day Actual:  176.360001
Day Difference:  0.774141695679873
Day Accuracy:  0.995629630268345
_____
Day Number 2620 for stock CRM
Day Forecast:  176.97290328736636
Day Actual:  174.229996
Day Difference:  2.7429072873663642
Day Accuracy:  0.9845009759323863
_____
Day Number 2621 for stock CRM
Day Forecast:  177.39871799372824
Day Actual:  174.990005
Day Difference:  2.408712993728244
Day Accuracy:  0.9864220383271687
_____
Day Number 2622 for stock CRM
Day Forecast:  177.0200628764561
Day Actual:  171.440002
Day Difference:  5.580060876456116
Day Accuracy:  0.9684778053640706
_____
Day Number 2623 for stock CRM
Day Forecast:  177.51753697551808
Day Actual:  173.880005
Day Difference:  3.6375319755180726
Day Accuracy:  0.9795088866289321
_____
Day Number 2624 for stock CRM
Day Forecast:  177.2121200334781
Day Actual:  176.550003
Day Difference:  0.662117033478097
Day Accuracy:  0.9962637034456051
_____
Day Number 2625 for stock CRM
Day Forecast:  177.51521536583328
Day Actual:  174.559998
Day Difference:  2.9552173658332777
Day Accuracy:  0.983523151255344
_____
Day Number 2626 for stock CRM
Day Forecast:  177.48434825907444
Day Actual:  182.100006
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Day Difference:  -4.61565774092557
Day Accuracy:  0.9746531708465426

_____
Day Number 2627 for stock CRM
Day Forecast:  177.48296704644017
Day Actual:  172.050003
Day Difference:  5.432964046440162
Day Accuracy:  0.9693888143924336

_____
Day Number 2628 for stock CRM
Day Forecast:  177.73572660816262
Day Actual:  175.110001
Day Difference:  2.625725608162611
Day Accuracy:  0.9852267990332

_____
Day Number 2629 for stock CRM
Day Forecast:  177.51478332671655
Day Actual:  178.610001
Day Difference:  -1.0952176732834573
Day Accuracy:  0.9938681055531517

_____
Day Number 2630 for stock CRM
Day Forecast:  177.8936043006887
Day Actual:  180.479996
Day Difference:  -2.5863916993112923
Day Accuracy:  0.9856693719158145

_____
Day Number 2631 for stock CRM
Day Forecast:  177.65224629850772
Day Actual:  181.399994
Day Difference:  -3.7477477014922727
Day Accuracy:  0.9793398686579213

_____
Day Number 2632 for stock CRM
Day Forecast:  177.9514553481768
Day Actual:  187.660004
Day Difference:  -9.708548651823179
Day Accuracy:  0.9482652219712029

_____
Day Number 2633 for stock CRM
Day Forecast:  177.86873004439332
Day Actual:  186.949997
Day Difference:  -9.08126695560668
Day Accuracy:  0.9514240861121454

_____
Day Number 2634 for stock CRM
Day Forecast:  177.96205752353538
Day Actual:  191.649994
Day Difference:  -13.687936476464614
Day Accuracy:  0.9285784664492888

_____
Day Number 2635 for stock CRM
Day Forecast:  178.09586395627747
Day Actual:  189.059998
Day Difference:  -10.964134043722538
Day Accuracy:  0.9420071185882349

_____
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```
Day Number 2636 for stock CRM
Day Forecast:  177.99722852016745
Day Actual:  185.550003
Day Difference:  -7.55277447983255
Day Accuracy:  0.9592952069107078
_____
Day Number 2637 for stock CRM
Day Forecast:  178.2700572871057
Day Actual:  188.339996
Day Difference:  -10.069938712894327
Day Accuracy:  0.946533190364439
_____
Day Number 2638 for stock CRM
Day Forecast:  178.10294093376578
Day Actual:  183.169998
Day Difference:  -5.067057066234213
Day Accuracy:  0.9723368612678905
_____
Day Number 2639 for stock CRM
Day Forecast:  178.36876657756937
Day Actual:  183.330002
Day Difference:  -4.961235422430633
Day Accuracy:  0.9729382241405821
_____
Day Number 2640 for stock CRM
Day Forecast:  178.2766993928774
Day Actual:  187.330002
Day Difference:  -9.053302607122617
Day Accuracy:  0.9516719024690844
_____
Day Number 2641 for stock CRM
Day Forecast:  178.4170314463271
Day Actual:  191.889999
Day Difference:  -13.472967553672902
Day Accuracy:  0.9297880680395808
_____
Day Number 2642 for stock CRM
Day Forecast:  178.47677937296618
Day Actual:  192.529999
Day Difference:  -14.053219627033826
Day Accuracy:  0.9270076367318019
_____
Day Number 2643 for stock CRM
Day Forecast:  178.46524815694323
Day Actual:  197.720001
Day Difference:  -19.254752843056764
Day Accuracy:  0.9026160593482054
_____
Day Number 2644 for stock CRM
Day Forecast:  178.6528290036226
Day Actual:  196.380005
Day Difference:  -17.72717599637741
Day Accuracy:  0.9097302396118311
_____
Day Number 2645 for stock CRM
Day Forecast:  178.55574576326424
Day Actual:  200.279999
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Day Difference:  -21.724253236735763
Day Accuracy:  0.8915305904473478

_____
Day Number 2646 for stock CRM
Day Forecast:  178.7765798064119
Day Actual:  200.740005
Day Difference:  -21.963425193588108
Day Accuracy:  0.8905877022689717

_____
Day Number 2647 for stock CRM
Day Forecast:  178.6994295380501
Day Actual:  198.880005
Day Difference:  -20.1805754619499
Day Accuracy:  0.8985288869941959

_____
Day Number 2648 for stock CRM
Day Forecast:  178.8547629441126
Day Actual:  188.339996
Day Difference:  -9.48523305588742
Day Accuracy:  0.9496377123429087

_____
Day Number 2649 for stock CRM
Day Forecast:  178.87447741400388
Day Actual:  189.559998
Day Difference:  -10.68552058599613
Day Accuracy:  0.9436298760353641

_____
Day Number 2650 for stock CRM
Day Forecast:  178.91956692877767
Day Actual:  188.089996
Day Difference:  -9.170429071222344
Day Accuracy:  0.9512444613416742

_____
Day Number 2651 for stock CRM
Day Forecast:  179.04430620801466
Day Actual:  185.509995
Day Difference:  -6.465688791985343
Day Accuracy:  0.9651464127742263

_____
Day Number 2616 for stock CSCO
Day Forecast:  44.84644962917389
Day Actual:  45.959999
Day Difference:  -1.1135493708261137
Day Accuracy:  0.9757713360518978

_____
Day Number 2617 for stock CSCO
Day Forecast:  44.845756357008284
Day Actual:  45.599998
Day Difference:  -0.7542416429917154
Day Accuracy:  0.9834596123668313

_____
Day Number 2618 for stock CSCO
Day Forecast:  44.84583087699736
Day Actual:  47.82
Day Difference:  -2.974169123002639
Day Accuracy:  0.9378049116896144

_____
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Day Number 2619 for stock CSCO
Day Forecast:  44.845822866826104
Day Actual:  46.299999
Day Difference:  -1.4541761331738954
Day Accuracy:  0.9685923074604409
_____
Day Number 2620 for stock CSCO
Day Forecast:  44.84582372784131
Day Actual:  46.889999
Day Difference:  -2.0441752721586965
Day Accuracy:  0.9564048770366002
_____
Day Number 2621 for stock CSCO
Day Forecast:  44.84582363529058
Day Actual:  46.939999
Day Difference:  -2.0941753647094217
Day Accuracy:  0.9553861225112207
_____
Day Number 2622 for stock CSCO
Day Forecast:  44.84582364523888
Day Actual:  46.860001
Day Difference:  -2.0141773547611166
Day Accuracy:  0.9570171294968364
_____
Day Number 2623 for stock CSCO
Day Forecast:  44.845823644169535
Day Actual:  47.830002
Day Difference:  -2.9841783558304655
Day Accuracy:  0.9376086508248428
_____
Day Number 2624 for stock CSCO
Day Forecast:  44.84582364428448
Day Actual:  48.130001
Day Difference:  -3.2841773557155207
Day Accuracy:  0.9317644444737178
_____
Day Number 2625 for stock CSCO
Day Forecast:  44.84582364427212
Day Actual:  48.049999
Day Difference:  -3.2041753557278767
Day Accuracy:  0.9333158080663462
_____
Day Number 2626 for stock CSCO
Day Forecast:  44.84582364427345
Day Actual:  47.419998
Day Difference:  -2.574174355726548
Day Accuracy:  0.9457154267335366
_____
Day Number 2627 for stock CSCO
Day Forecast:  44.84582364427331
Day Actual:  43.669998
Day Difference:  1.17582564427331
Day Accuracy:  0.9737807102485125
_____
Day Number 2628 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.07
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```
Day Difference:  -0.2241763557266765
Day Accuracy:  0.9950260404764438

_____
Day Number 2629 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.349998
Day Difference:  -0.5041743557266756
Day Accuracy:  0.9888825936502428

_____
Day Number 2630 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.48
Day Difference:  -1.634176355726673
Day Accuracy:  0.9648413004361731

_____
Day Number 2631 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.169998
Day Difference:  -1.3241743557266759
Day Accuracy:  0.9713195925257203

_____
Day Number 2632 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.830002
Day Difference:  -0.9841783557266766
Day Accuracy:  0.9785254568453504

_____
Day Number 2633 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.32
Day Difference:  -0.4741763557266765
Day Accuracy:  0.9895371501384228

_____
Day Number 2634 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.16
Day Difference:  -0.3141763557266728
Day Accuracy:  0.9930430390671684

_____
Day Number 2635 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.470001
Day Difference:  -0.6241773557266797
Day Accuracy:  0.986272765735662

_____
Day Number 2636 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  44.75
Day Difference:  0.0958236442733238
Day Accuracy:  0.9978632649266648

_____
Day Number 2637 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.220001
Day Difference:  -0.37417735572667965
Day Accuracy:  0.9917254014274197

_____
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```
Day Number 2638 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.310001
Day Difference:  -1.464177355726676
Day Accuracy:  0.9683831283932238
_____
Day Number 2639 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.150002
Day Difference:  -1.3041783557266768
Day Accuracy:  0.9717404485545488
_____
Day Number 2640 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.639999
Day Difference:  -1.7941753557266793
Day Accuracy:  0.9615314023543037
_____
Day Number 2641 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.060001
Day Difference:  -1.214177355726676
Day Accuracy:  0.9736392242864547
_____
Day Number 2642 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.630001
Day Difference:  -0.7841773557266762
Day Accuracy:  0.9828144348336377
_____
Day Number 2643 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.419998
Day Difference:  -1.5741743557266759
Day Accuracy:  0.9660884441286129
_____
Day Number 2644 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.630001
Day Difference:  -0.7841773557266762
Day Accuracy:  0.9828144348336377
_____
Day Number 2645 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  45.810001
Day Difference:  -0.964177355726676
Day Accuracy:  0.9789526886121073
_____
Day Number 2646 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.700001
Day Difference:  -1.8541773557266765
Day Accuracy:  0.9602959889502641
_____
Day Number 2647 for stock CSCO
Day Forecast:  44.845823644273324
Day Actual:  46.66
```

```
Day Difference:   -1.8141763557266728
Day Accuracy:   0.9611192379827117

_____

Day Number 2648 for stock CSCO
Day Forecast:   44.845823644273324
Day Actual:   45.93
Day Difference:   -1.084176355726676
Day Accuracy:   0.976395028179258

_____

Day Number 2649 for stock CSCO
Day Forecast:   44.845823644273324
Day Actual:   46.259998
Day Difference:   -1.4141743557266793
Day Accuracy:   0.9694298656103124

_____

Day Number 2650 for stock CSCO
Day Forecast:   44.845823644273324
Day Actual:   46.400002
Day Difference:   -1.5541783557266768
Day Accuracy:   0.9665047782599949

_____

Day Number 2651 for stock CSCO
Day Forecast:   44.845823644273324
Day Actual:   45.779999
Day Difference:   -0.9341753557266728
Day Accuracy:   0.9795942469171598

_____
```

```
In [33]: accuracy_df.to_csv('Datasets2/accuracy_df.csv')
         forecast_df.to_csv('Datasets2/forecase_df.csv')
         difference_df.to_csv('Datasets2/difference_df.csv')
         actual_df.to_csv('Datasets2/actual_df.csv')
```

MAPE Calculation

```python
In [34]: # Consider a list APE to store the
         # APE value for each of the records in dataset
         APE = []

         for column in column_names:
             MAPE = 0
             column_name = df[column].name
             print("*********************************************************")
             print("MAPE FOR", column_name)
             print("_____")
             # Iterate over the list values
             for i in range(36):

                 # Calculate percentage error
                 per_err = (actual_df[column_name] - forecast_df[column_name]) /

                 # Take absolute value of
                 # the percentage error (APE)
                 per_err = abs(per_err)

                 # Append it to the APE list
             APE.append(per_err)

             # Calculate the MAPE
             MAPE = sum(APE)/len(APE)
             # MAPE_df[column_name] = MAPE
             # Print the MAPE value and percentage
             print(column_name, "RAW MAPE METRIC")
             print("_____")
             print(round(MAPE, 2))
             print("_____")
             print(column_name, "MAPE PERCENTAGE")
             print("_____")
             print(round(MAPE*100, 2))
```

```
**************************************************
MAPE FOR AAPL
_____
AAPL RAW MAPE METRIC
_____
0       0.01
1       0.00
2       0.01
3       0.01
4       0.02
5       0.02
6       0.02
7       0.04
8       0.05
9       0.08
10      0.10
11      0.05
12      0.06
13      0.07
```

In [35]: `APE = pd.DataFrame(APE)`

In [36]: `APE.head(2)`

Out[36]:

	0	1	2	3	4	5	6	7	8
AAPL	0.007077	0.002550	0.006355	0.013589	0.021495	0.023628	0.017026	0.042310	0.048784
ADBE	0.011974	0.002628	0.018932	0.026622	0.028093	0.026491	0.015747	0.033204	0.044735

2 rows × 36 columns

In [37]: `APE = APE.T`

In [38]: `APE.head(2)`

Out[38]:

	AAPL	ADBE	ORCL	AMZN	INTC	MSFT	NVDA	IBM	NFLX	
0	0.007077	0.011974	0.012249	0.005632	0.024492	0.002569	0.029003	0.030110	0.012439	0.
1	0.002550	0.002628	0.015629	0.009848	0.011154	0.003990	0.032672	0.022244	0.000077	0.

In [39]: `APE.to_csv("Datasets2/APE.csv")`