Getting Started with Python

Time Series Project

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Resources

1. #### [Clean Dataset](some-link)

2. #### [Submission Portal](https://dasclab.uonbi.ac.ke/analytics/projects)

If you are having problems please refer to this document:

3. #### [Time Series Notebook](https://dasclab.uonbi.ac.ke/dstraining/time-series-data.html)

Instructions

Import all the libraries listed in the first cell. Make sure all modules are installed.

Use the provided data set to answer the following:

1. a) What is the lowest price for Safaricom (*SCOM*)
   b) What was the date when Safaricom had the lowest price?

2. a) What is the highest price Safaricom stock reached in the data
   b) What was the date when Safaricom stock recorded the highest price?

3. Create a line plot for Safaricom stock and verify if the information provided above is indeed correct.

4. Select __one__ of the sectors provided (agric, comm, bank, const, energy, insur, invest, manu)

   a) Use __pandas__ to create a subset containing all the rows of the dataframe and only companies in your selected sector. Rename this dataframe to the __sector_name_df__

   b) Using the subset for the sector, use __matplotlib__ subplot to create subplots to fit all the sector stocks in one plot. One row can have a maximum of 3 charts.

   c) Using your sector DataFrame use the `corr()` DataFrame method to come up with a correlogram. Create a DataFrame for these correlations

   d) Use __Seaborn__ to plot the __correlation plot__ for your sector stocks.

<u>Key performance Metrics</u>:

- Go an extra step to produce charts that are visually appealing

- Ensure all the plots have a Title

- Ensure all plots have x labels and y labels where applicable

- Your plots should be clearly visible. Change the size of your plot to a comfortable width and height.

```
width and height.

- Save all your plots
```

In [8]:

```
import os
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
```

Ensure that you have the ***clean_stock_prices.csv*** file in your working directory

In [12]:

```
os.listdir()
```

Out[12]:

```
['.ipynb_checkpoints',
 'ACFrOgDNOpXraTWAiHYnIJsSZj9PkjkTe9jHRVpW_lhLtlGyJe-iUVQT_0bi4gXfb2XUhOrNaclA_1cuyp9TaPgufO_VFO1k4Dp_dcrT6SV0-3MpU8Ry7bQjP1YKOpM=.pdf',
 'Anaconda3-2021.05-Windows-x86_64.exe',
 'arduino-ide_2.0.0-rc4_Windows_64bit.exe',
 'AutoCAD_2022_English_Win_64bit_di_en-US_setup_webinstall.exe',
 'AutoCAD_2022_English_Win_64bit_dlm.sfx.exe',
 'banking_stock_prices.png',
 'BRILLIANT KCPE  SCIENCE STD 8.pdf',
 'ChromeSetup.exe',
 'Class-8-Science-End-Term-1-2020..pdf',
 'clean_stock_data.csv',
 'clean_stock_prices.csv',
 'Click_me_to_install_SnapTube_tube_organic_search.apk',
 'Click_me_to_install_SnapTube_tube_snaptubecom.apk',
 'codeblocks-20.03mingw-setup.exe',
 'Course Syllabus.docx',
 'desktop.ini',
 'MacGyver 2016 Season 1 Complete HDTV x264 [i_c]',
 'Major Lazer – Light it Up Remix (feat. Nyla & Fuse ODG) (Music Video) by Method Studios.webm',
 'MathcadPrime1.0',
 'MathcadPrime1.0.zip',
 'MATHS-4.pdf',
 'matlab_R2021b_win64.exe',
 'musicmatters_yearmix_2019_2020_tracklist_h264_35953.mp4',
 'mysql-installer-web-community-8.0.28.0.msi',
 'new_daily_prices.csv',
 'Politics and Policy Final Project Dataset (1).xlsx',
 'Politics and Policy Final Project Dataset.xlsx',
 'project-time-series-workbook (1).ipynb',
 'project-time-series-workbook (2).ipynb',
 'project-time-series-workbook.ipynb',
 'PTC Mathcad Prime 6.0.0.0 [FileCR].zip',
 'python-3.10.2-amd64.exe',
 'R-4.1.2-win.exe',
 'rarreg.key',
 'RStudio-2021.09.2-382.exe',
 'Snaptube_v5.18.0.5183310_apkpure.com.apk',
 'SOCIAL-3.pdf',
 'SpotifySetup.exe',
 'Star Wars All Movies Collection (1977-2015) 720p Bluray x264 Dual Audio [Hindi-English] - KartiKing',
 'Statistical tables-20211109.zip',
 'Student workbook',
 'student_copy_pandas_workbook.ipynb',
 'student_workbook_stocks.ipynb',
 'Telegram Desktop',
 'top-10-brands.png',
 'tsetup.2.8.4.exe',
 'uTorrent.exe',
 'vehicle_data (1).csv',
 'vehicle_data (2).csv',
 'vehicle_data (3).csv',
 'vehicle_data.csv',
```

```
 'vehicle_dataset_project (1).ipynb',
 'vehicle_dataset_project (2).ipynb',
 'vehicle_dataset_project.ipynb',
 'videoplayback (1).mp4',
 'videoplayback.mp4',
 'VSPER theory and molecular shapes.edited (1) 2.docx',
 'WhatsApp Image 2021-07-21 at 3.43.38 PM.jpeg',
 'WhatsApp Image 2021-07-21 at 3.43.39 PM.jpeg',
 'WhatsApp Image 2022-02-05 at 20.35.30.jpeg',
 'WhatsAppSetup (1).exe',
 'WhatsAppSetup.exe',
 'winrar-x64-602.exe',
 '[1337x.buzz]__Lucifer.S05.480p.x264-ZMNT.torrent',
 '_Getintopc.com_PTC.Mathcad.Prime.6.0.0.0.Win64',
 '_Getintopc.com_PTC.Mathcad.Prime.6.0.0.0.Win64.rar',
 '_temp_matlab_R2021b_win64']
```

If you can see the *clean_stock_prices.csv* as an output in the above cell, read the data into a DataFrame using pandas

In [13]:

```
# read in the necessary file ('clean_stock_prices.csv')
df = pd.read_csv('clean_stock_prices.csv',index_col=0)
df.head()
```

Out[13]:

Date	EGAD	KUKZ	LIMT	SASN	WTK	CGEN	ABSA	BKG	DTK	EQTY	...	BAT	CAR
2022-01-13	12.90	385.0	320.0	22.20	130.00	54.00	11.80	30.00	59.00	49.55	...	440.0	10.8
2022-01-11	13.80	385.0	320.0	20.55	134.75	44.75	11.90	30.75	59.50	52.00	...	445.0	10.8
2022-01-07	13.80	420.0	320.0	21.25	132.00	37.05	11.80	29.05	60.00	53.00	...	442.0	10.9
2022-01-06	13.80	420.0	320.0	20.25	130.75	33.70	11.80	29.30	60.00	53.00	...	442.0	10.9
2022-01-05	12.85	420.0	320.0	19.95	130.75	30.60	11.75	29.50	59.75	53.00	...	442.0	10.9

5 rows × 60 columns

In [14]:

```
df.tail()
```

Out[14]:

Date	EGAD	KUKZ	LIMT	SASN	WTK	CGEN	ABSA	BKG	DTK	EQTY	...	BAT	CAR
2021-08-09	12.15	415.0	300.00	19.50	134.5	35.0	9.80	32.40	65.75	50.25	...	445.5	12.2
2021-08-06	12.15	415.0	300.00	20.00	134.5	35.0	9.80	32.40	65.75	50.00	...	454.0	12.2
2021-08-05	12.30	415.0	320.00	20.00	134.5	35.0	9.82	31.85	65.00	49.40	...	450.0	12.2
2021-08-04	12.00	415.0	320.00	19.95	135.0	35.0	9.76	29.75	64.00	49.10	...	455.0	12.0
2021-08-03	11.80	415.0	304.75	19.95	134.5	35.0	9.82	29.50	65.00	49.00	...	450.0	12.0

5 rows × 60 columns

Use this part to answer questions 1, 2 and 3

In [15]:

```
# lowest price for Safaricom
df['SCOM'].nsmallest(1)
```

Out[15]:

```
Date
2021-12-07    36.5
Name: SCOM, dtype: float64
```

In [16]:

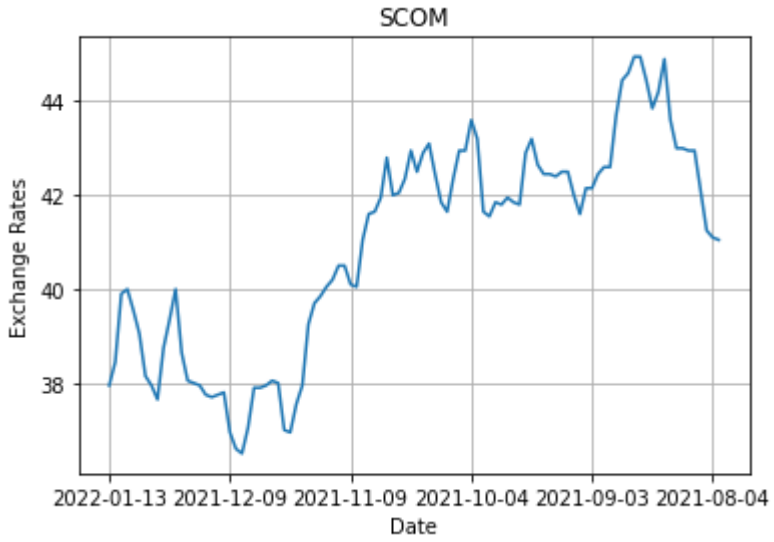
```
# highest price for Safaricom
df['SCOM'].nlargest(1)
```

Out[16]:

```
Date
2021-08-24    44.95
Name: SCOM, dtype: float64
```

In [19]:

```
# Plot SCOM to confirm above observations
df['SCOM'].plot()
plt.grid()
plt.xlabel('Date')
plt.ylabel('Exchange Rates')
plt.title('SCOM')
plt.show()
```



Use this part to answer question 4

In [ ]:

```
# agriculatural companies
agric = ['EGAD','KUKZ','LIMT','SASN','WTK']

# commercial companies
comm = ['XPRS','KQ','LKL','NBV', 'NMG','SMER','SCAN','SGL','TPSE','UCHM']

# banking companies
bank = ['ABSA','BKG','DTK','EQTY','HFCK','IMH', 'KCB','NBK', 'NCBA','SBIC','SCBK','COOP']

# construction sector
const = ['ARM','BAMB','CRWN','CABL','PORT']

# energy sector
energy = ['KEGN','KPLC','TOTL','UMME']

# insurance sector
insur = ['BRIT','CIC','JUB','KNRE','LBTY', 'SLAM']

# investement sector
invest = ['CTUM','HAFR','KURV','OCH','TCL','NSE']


# manufacturing sector
manu = ['BOC','BAT','CARB','EABL','EVRD','FTGH','ORCH', 'MSC','UNGA']
```

To subset a sector simply use the **__slice__** notation. For example if I choose the Insurance sector, i will use the **__insur__** list

In [22]:

```
insur_df = df.loc[:,'BRIT':'SLAM'].copy()
insur_df.head()
```

Out[22]:

Date	BRIT	CIC	JUB	KNRE	LBTY	SLAM
2022-01-13	7.26	2.17	310.00	2.27	7.00	10.50
2022-01-11	7.14	2.17	310.00	2.32	7.00	10.60
2022-01-07	7.52	2.13	310.00	2.30	7.04	11.55
2022-01-06	7.52	2.15	310.50	2.29	7.04	11.55
2022-01-05	7.50	2.10	316.75	2.30	7.04	11.55

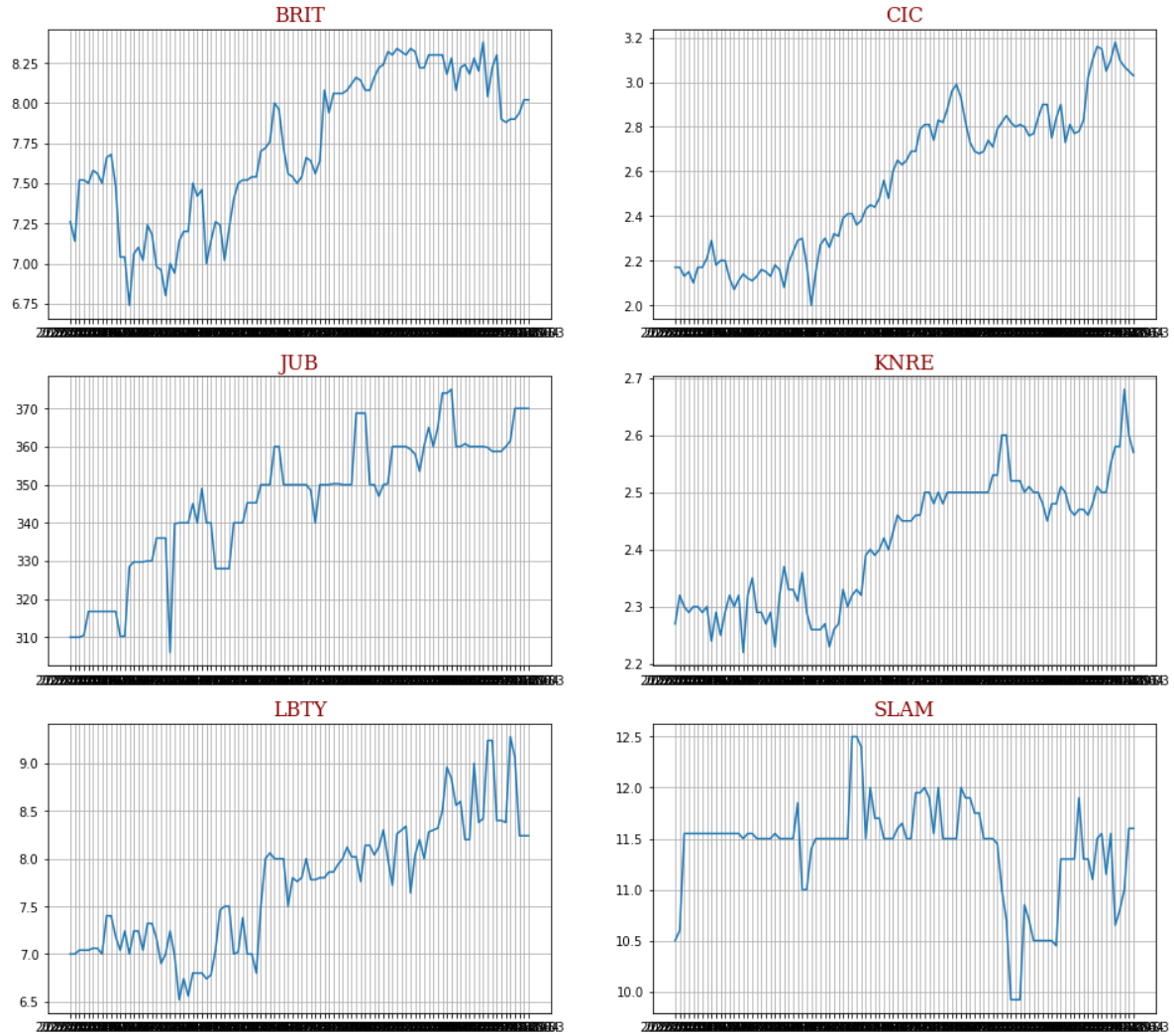
In [23]:

```
insur_cols = insur_df.columns
for insurance in insur_cols:
    print(insurance)
```

```
BRIT
CIC
JUB
KNRE
LBTY
SLAM
```

In [25]:

```
insur_cols = insur_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,insurance in enumerate(insur_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(insurance,fontdict=font)
    plt.grid()
    plt.plot(insurance,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```



In [26]:

```
agric_df=df.loc[:,'EGAD':'WTK'].copy()
agric_df.head()
```

Out[26]:

Date	EGAD	KUKZ	LIMT	SASN	WTK
2022-01-13	12.90	385.0	320.0	22.20	130.00
2022-01-11	13.80	385.0	320.0	20.55	134.75
2022-01-07	13.80	420.0	320.0	21.25	132.00
2022-01-06	13.80	420.0	320.0	20.25	130.75
2022-01-05	12.85	420.0	320.0	19.95	130.75

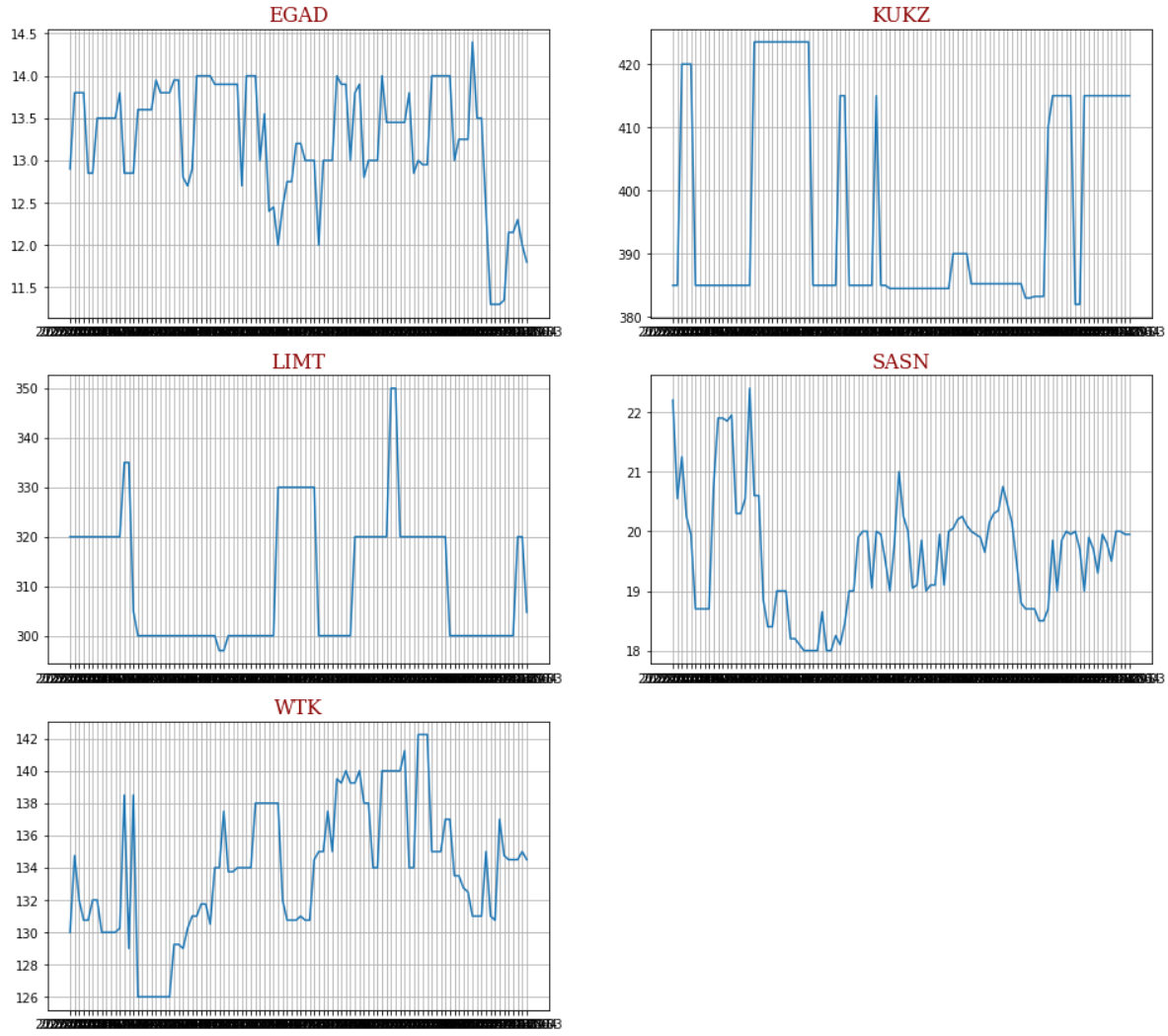
In [27]:

```
agric_cols=agric_df.columns
for agriculture in agric_cols:
    print(agriculture)
```

```
EGAD
KUKZ
LIMT
SASN
WTK
```

In [28]:

```
agric_cols = agric_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,agriculture in enumerate(agric_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(agriculture,fontdict=font)
    plt.grid()
    plt.plot(agriculture,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```



In [29]:

```
comm_df=df.loc[:,'XPRS':'UCHM'].copy()
comm_df.head()
```

Out[29]:

Date	XPRS	KQ	LKL	NBV	NMG	SMER	SCAN	SGL	TPSE	UCHM
2022-01-13	3.37	3.83	3.98	5.12	18.55	2.75	4.10	14.10	15.00	0.23
2022-01-11	3.50	3.83	4.00	5.30	19.00	2.82	4.14	15.50	15.00	0.21
2022-01-07	3.90	3.83	3.99	4.94	19.45	2.78	4.18	14.90	15.25	0.23
2022-01-06	4.10	3.83	4.00	4.89	19.90	2.80	4.12	14.90	15.25	0.23
2022-01-05	4.10	3.83	4.00	5.06	19.40	2.80	4.16	13.55	15.25	0.23

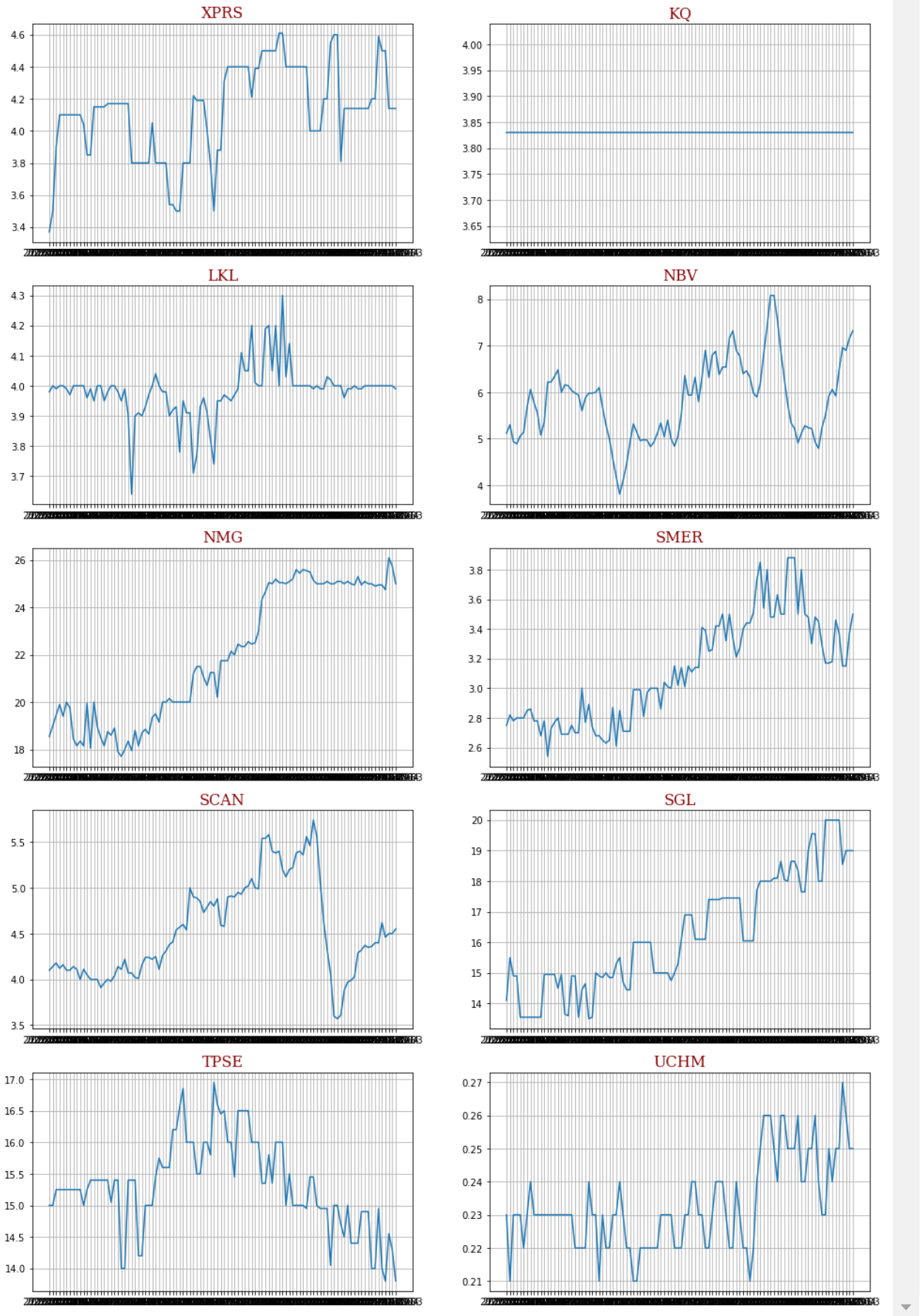
In [37]:

```
comm_cols=comm_df.columns
for commercial in comm_cols:
    print(commercial)
```

```
XPRS
KQ
LKL
NBV
NMG
SMER
SCAN
SGL
TPSE
UCHM
```

In [38]:

```
comm_cols = comm_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,commercial in enumerate(comm_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(commercial,fontdict=font)
    plt.grid()
    plt.plot(commercial,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```


XPRS
KQ
LKL
NBV
NMG
SMER
SCAN
SGL
TPSE
UCHM

In [33]:

```
bank_df=df.loc[:,'ABSA':'COOP'].copy()
bank_df.head()
```

Out[33]:

Date	ABSA	BKG	DTK	EQTY	HFCK	IMH	KCB	NBK	NCBA	SBIC	SCBK	COOP
2022-01-13	11.80	30.00	59.00	49.55	3.64	21.00	45.25	4.12	25.70	88.5	129.50	12.55
2022-01-11	11.90	30.75	59.50	52.00	3.81	21.50	45.85	4.12	25.95	87.5	130.00	12.80
2022-01-07	11.80	29.05	60.00	53.00	3.81	21.40	46.00	4.12	25.95	87.0	130.50	12.95
2022-01-06	11.80	29.30	60.00	53.00	3.89	21.45	45.90	4.12	25.90	87.0	130.75	13.00
2022-01-05	11.75	29.50	59.75	53.00	3.81	21.45	45.50	4.12	25.55	87.0	130.00	13.00

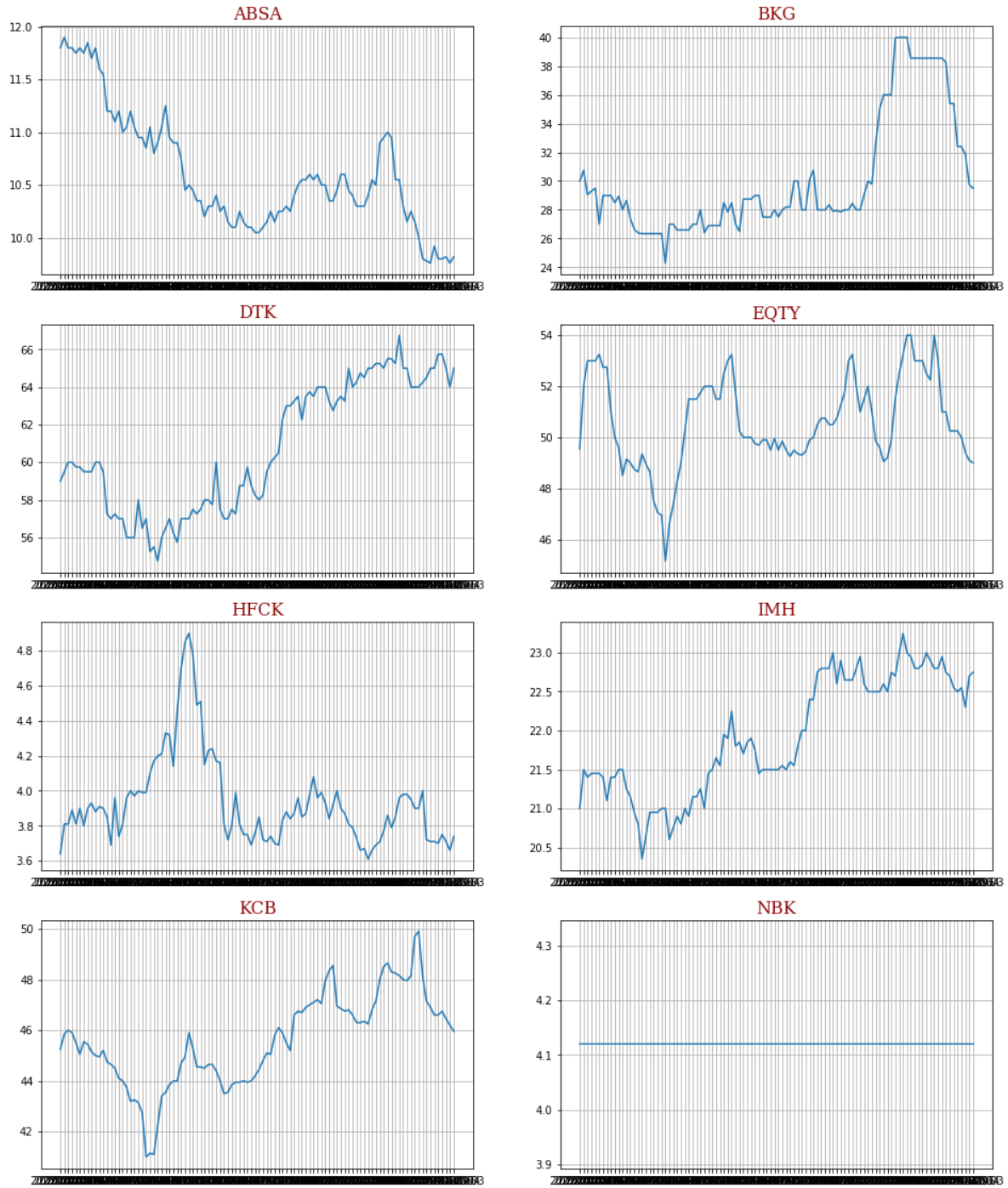
In [35]:

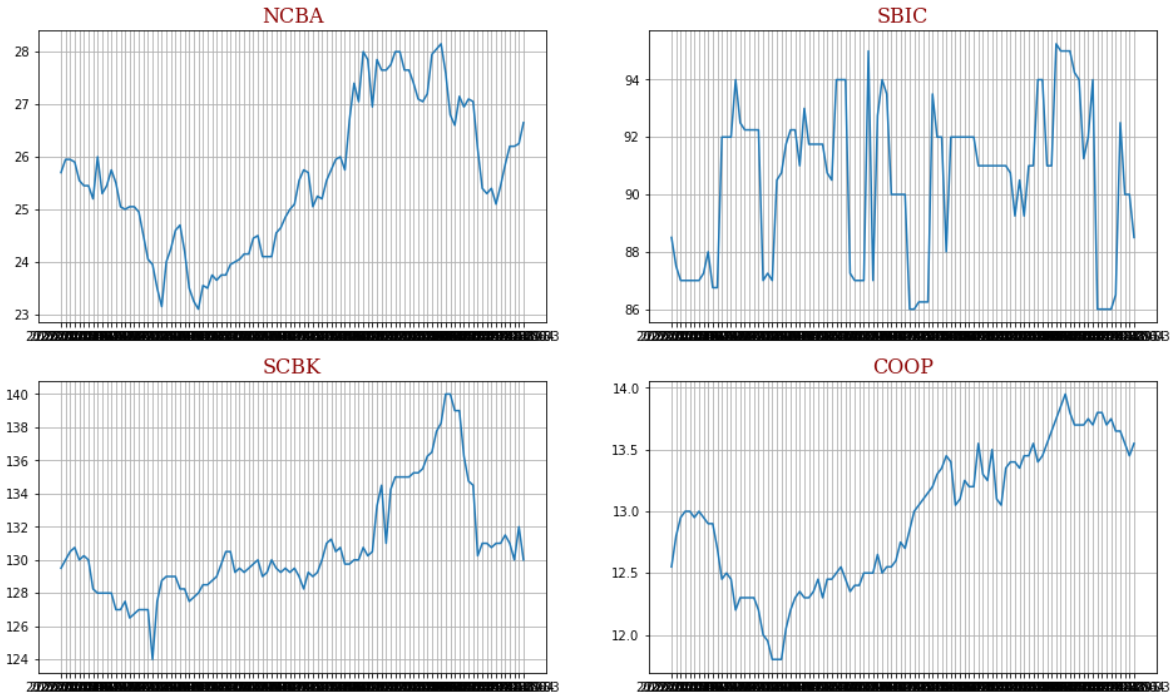
```
bank_cols=bank_df.columns
for banking in bank_cols:
    print(banking)
```

```
ABSA
BKG
DTK
EQTY
HFCK
IMH
KCB
NBK
NCBA
SBIC
SCBK
COOP
```

In [36]:

```
bank_cols = bank_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,banking in enumerate(bank_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(banking,fontdict=font)
    plt.grid()
    plt.plot(banking,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```





In [39]:

```
const_df=df.loc[:,'ARM':'PORT'].copy()
const_df.head()
```

Out[39]:

Date	ARM	BAMB	CRWN	CABL	PORT
2022-01-13	5.55	38.05	30.75	1.19	7.02
2022-01-11	5.55	37.75	30.50	1.20	7.20
2022-01-07	5.55	38.00	30.50	1.21	7.00
2022-01-06	5.55	37.85	30.75	1.27	7.02
2022-01-05	5.55	37.95	30.50	1.22	6.90

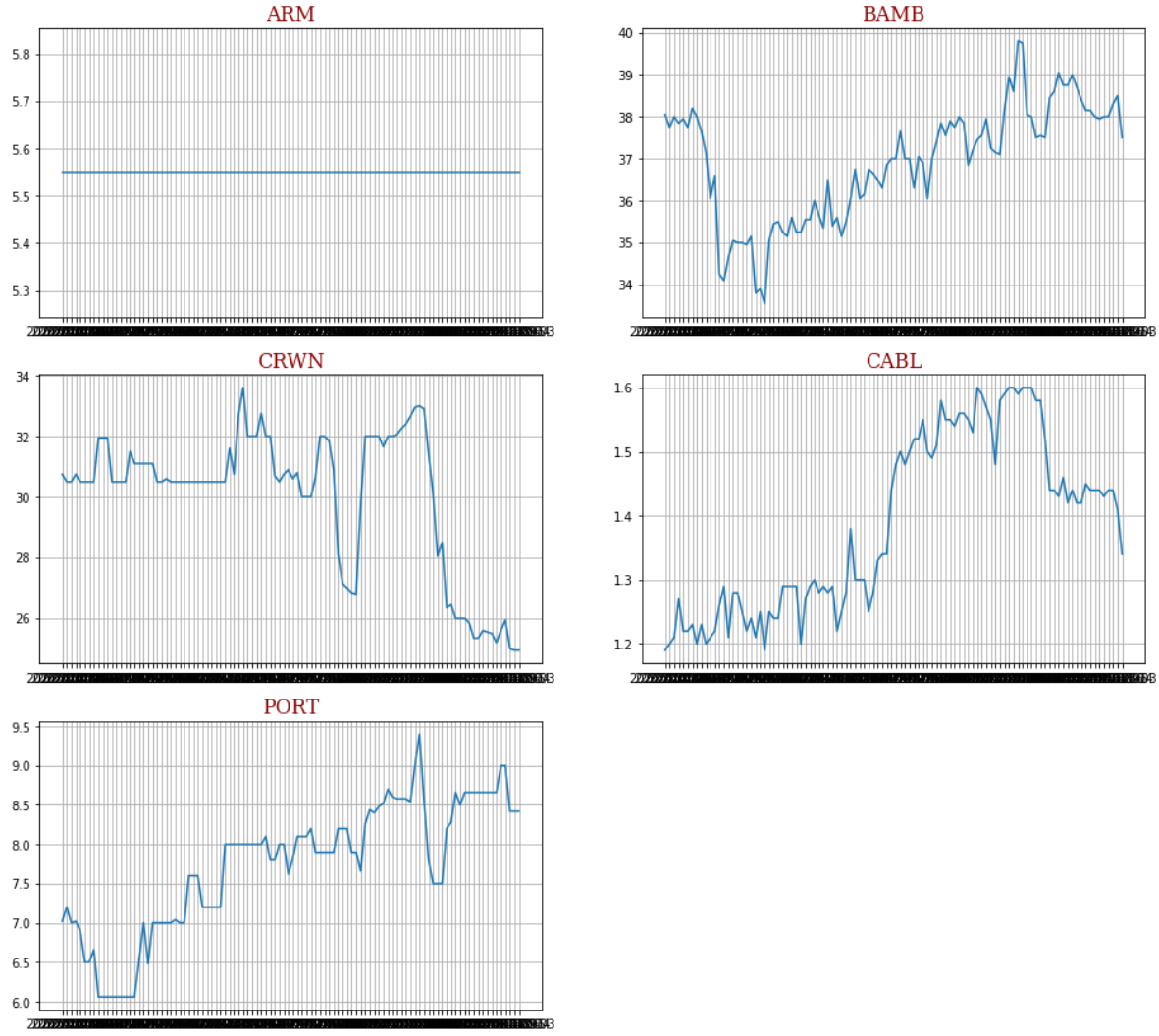
In [40]:

```
const_cols=const_df.columns
for construction in const_cols:
    print(construction)
```

```
ARM
BAMB
CRWN
CABL
PORT
```

In [41]:

```
const_cols = const_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,construction in enumerate(const_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(construction,fontdict=font)
    plt.grid()
    plt.plot(construction,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```



In [42]:

```
energ_df=df.loc[:,'KEGN':'UMME']
energ_df.head()
```

Out[42]:

Date	KEGN	KPLC	TOTL	UMME
2022-01-13	4.15	1.67	24.80	6.72
2022-01-11	4.13	1.71	24.20	6.74
2022-01-07	4.12	1.72	24.60	6.74
2022-01-06	4.13	1.72	24.55	6.74
2022-01-05	4.16	1.71	24.70	6.74

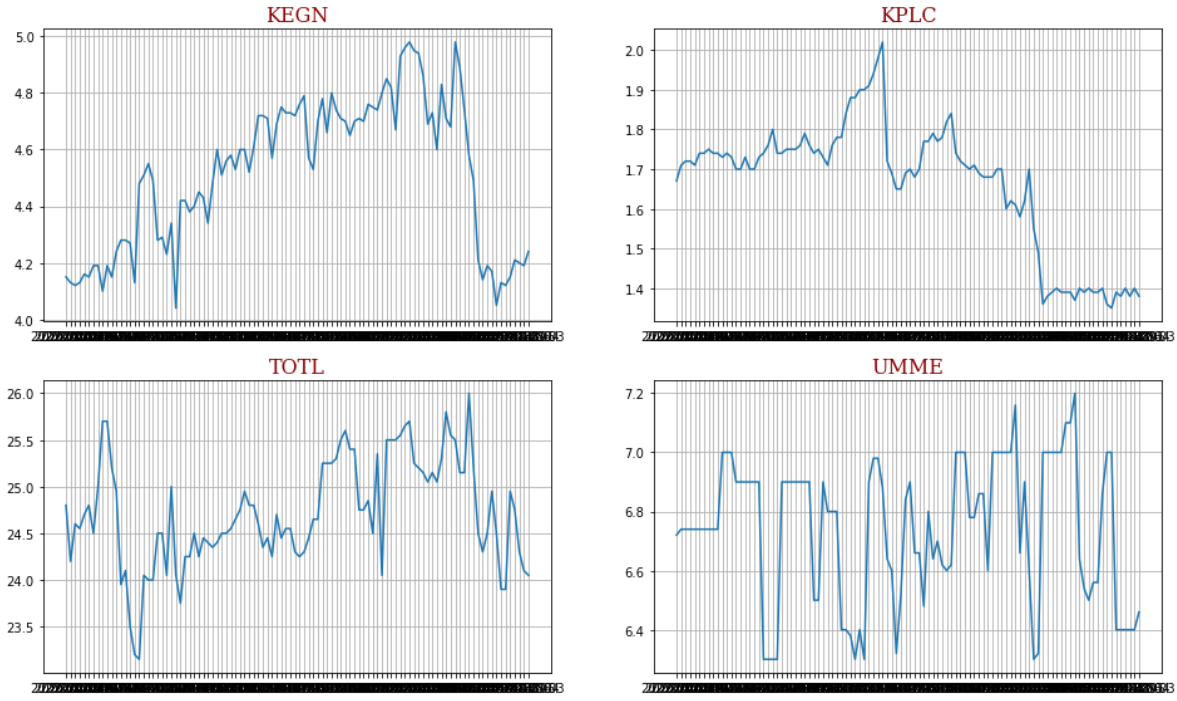
In [43]:

```
energ_cols=energ_df.columns
for energy in energ_cols:
    print(energy)
```

```
KEGN
KPLC
TOTL
UMME
```

In [44]:

```
energ_cols = energ_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,energy in enumerate(energ_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(energy,fontdict=font)
    plt.grid()
    plt.plot(energy,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```



In [45]:

```
invest_df=df.loc[:,'CTUM':'NSE'].copy()
invest_df.head()
```

Out[45]:

Date	CTUM	HAFR	KURV	OCH	TCL	NSE
2022-01-13	14.65	0.38	1500.0	1.80	1.36	8.36
2022-01-11	14.35	0.40	1500.0	1.84	1.36	8.26
2022-01-07	14.40	0.40	1500.0	1.88	1.36	8.16
2022-01-06	14.50	0.38	1500.0	1.97	1.32	8.20
2022-01-05	14.60	0.39	1500.0	1.97	1.29	8.12

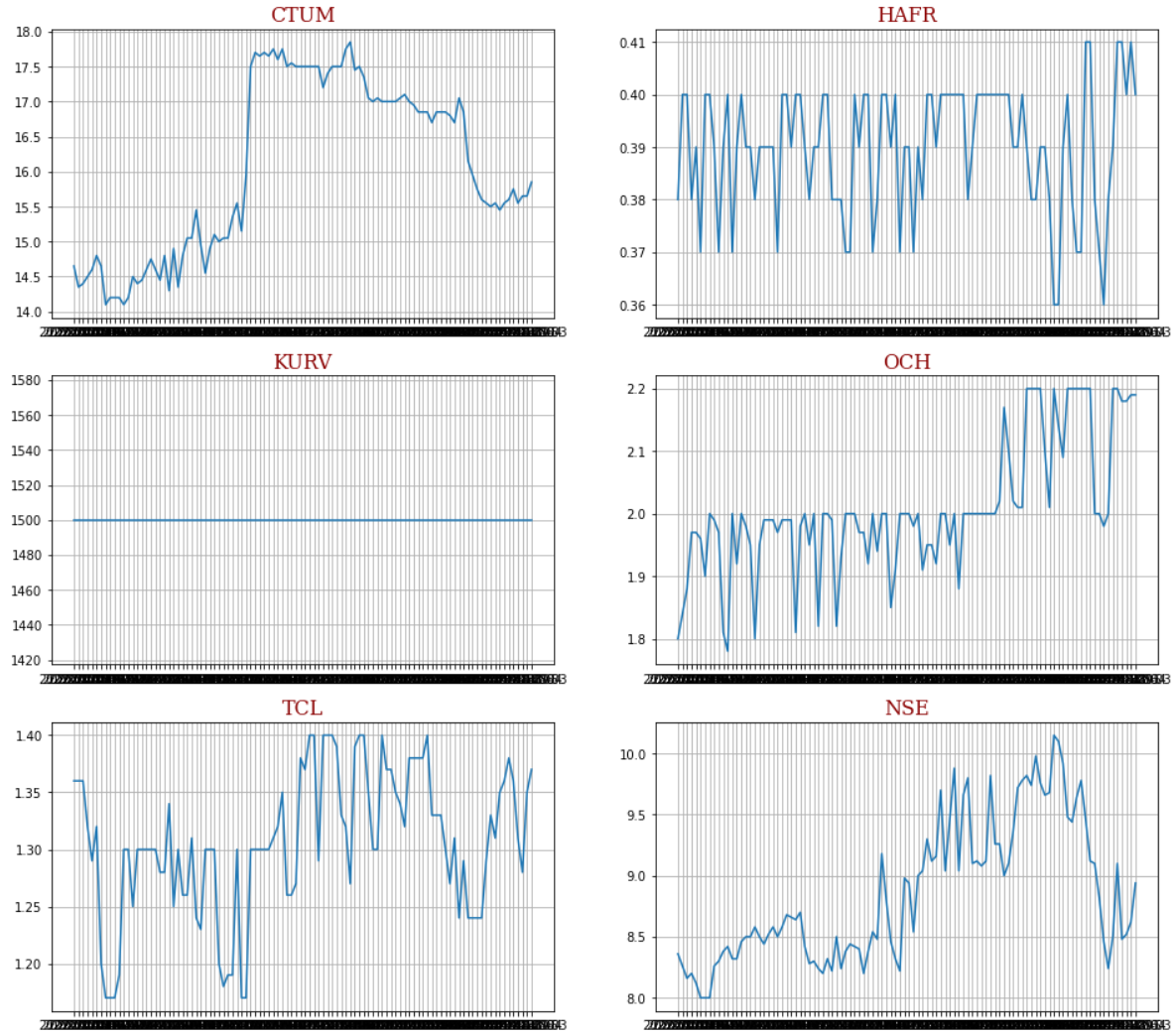
In [46]:

```
invest_cols=invest_df.columns
for investment in invest_cols:
    print(investment)
```

```
CTUM
HAFR
KURV
OCH
TCL
NSE
```

In [47]:

```
invest_cols = invest_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,investment in enumerate(invest_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(investment,fontdict=font)
    plt.grid()
    plt.plot(investment,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```



In [48]:

```
manu_df=df.loc[:,'BOC':'UNGA'].copy()
manu_df.head()
```

Out[48]:

Date	BOC	BAT	CARB	EABL	EVRD	FTGH	ORCH	MSC	UNGA
2022-01-13	72.5	440.0	10.80	151.50	0.96	1.34	10.4	0.27	27.10
2022-01-11	73.0	445.0	10.85	161.00	0.88	1.31	10.4	0.27	27.65
2022-01-07	73.0	442.0	10.90	164.75	0.94	1.30	10.4	0.27	27.65
2022-01-06	72.0	442.0	10.90	160.75	0.99	1.29	10.4	0.27	27.65
2022-01-05	70.0	442.0	10.90	163.75	0.99	1.26	10.4	0.27	27.65

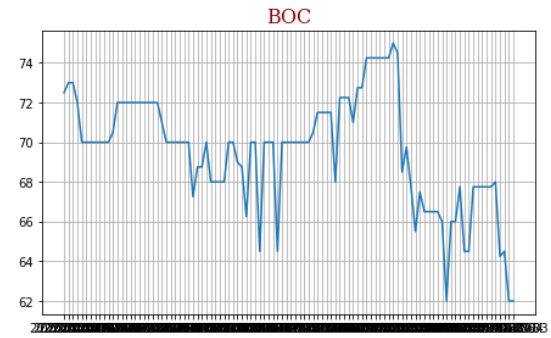
In [49]:

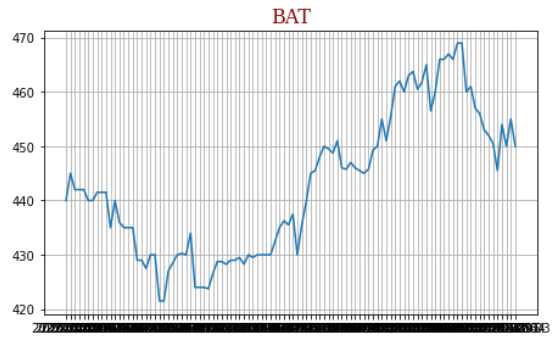
```
manu_cols=manu_df.columns
for manufacturing in manu_cols:
    print(manufacturing)
```

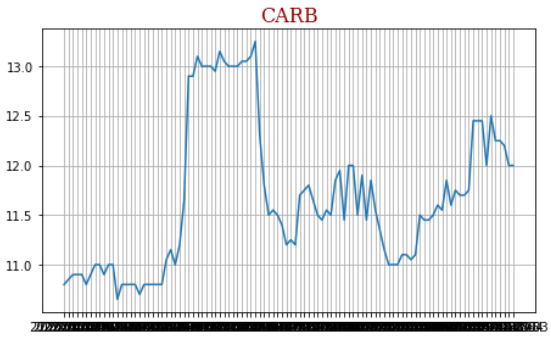
```
BOC
BAT
CARB
EABL
EVRD
FTGH
ORCH
MSC
UNGA
```

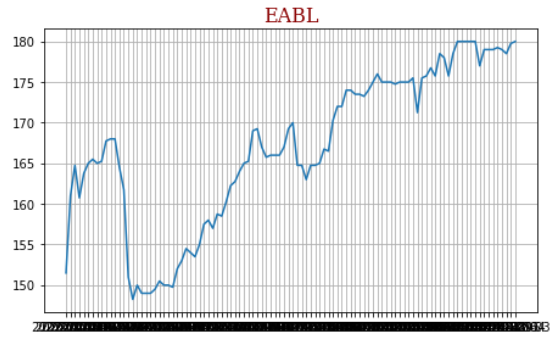
In [50]:

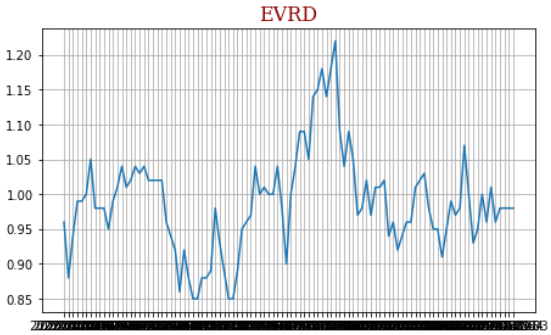
```
manu_cols = manu_df.columns

font = {'family': 'serif',
        'color':  'darkred',
        'weight': 'normal',
        'size': 16,
        }

for idx,manufacturing in enumerate(manu_cols,start=1):
    plt.subplot(6,2,idx)
    plt.title(manufacturing,fontdict=font)
    plt.grid()
    plt.plot(manufacturing,data=df)

fig = plt.gcf()
fig.set_size_inches(16,30)
plt.show()
```

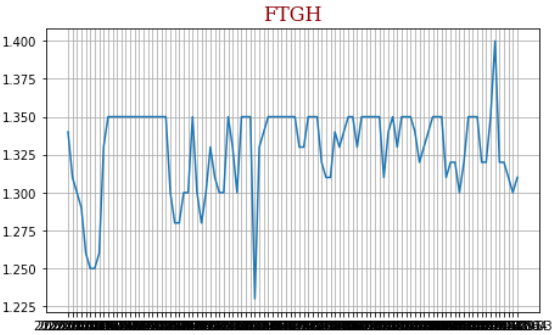

BOC
74
72
70
68
66
64
62

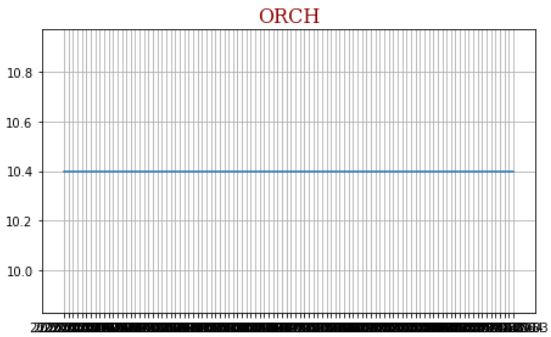

BAT
470
460
450
440
430
420

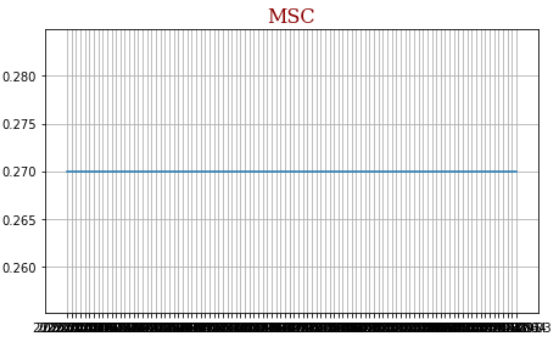

CARB
13.0
12.5
12.0
11.5
11.0

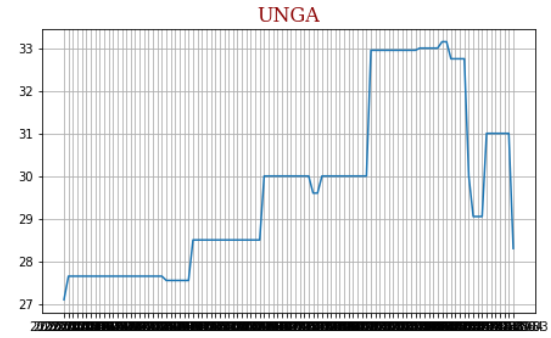

EABL
180
175
170
165
160
155
150


EVRD
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85


FTGH
1.400
1.375
1.350
1.325
1.300
1.275
1.250
1.225


ORCH
10.8
10.6
10.4
10.2
10.0


MSC
0.280
0.275
0.270
0.265
0.260


UNGA
33
32
31
30
29
28
27

In [55]:

```
insur_df.corr(method='pearson')
```

Out[55]:

	BRIT	CIC	JUB	KNRE	LBTY	SLAM
BRIT	1.000000	0.843570	0.745239	0.824231	0.791978	-0.318103
CIC	0.843570	1.000000	0.819647	0.914090	0.878433	-0.247342
JUB	0.745239	0.819647	1.000000	0.819330	0.734525	-0.241677
KNRE	0.824231	0.914090	0.819330	1.000000	0.800351	-0.282419
LBTY	0.791978	0.878433	0.734525	0.800351	1.000000	-0.326399
SLAM	-0.318103	-0.247342	-0.241677	-0.282419	-0.326399	1.000000

In [58]:

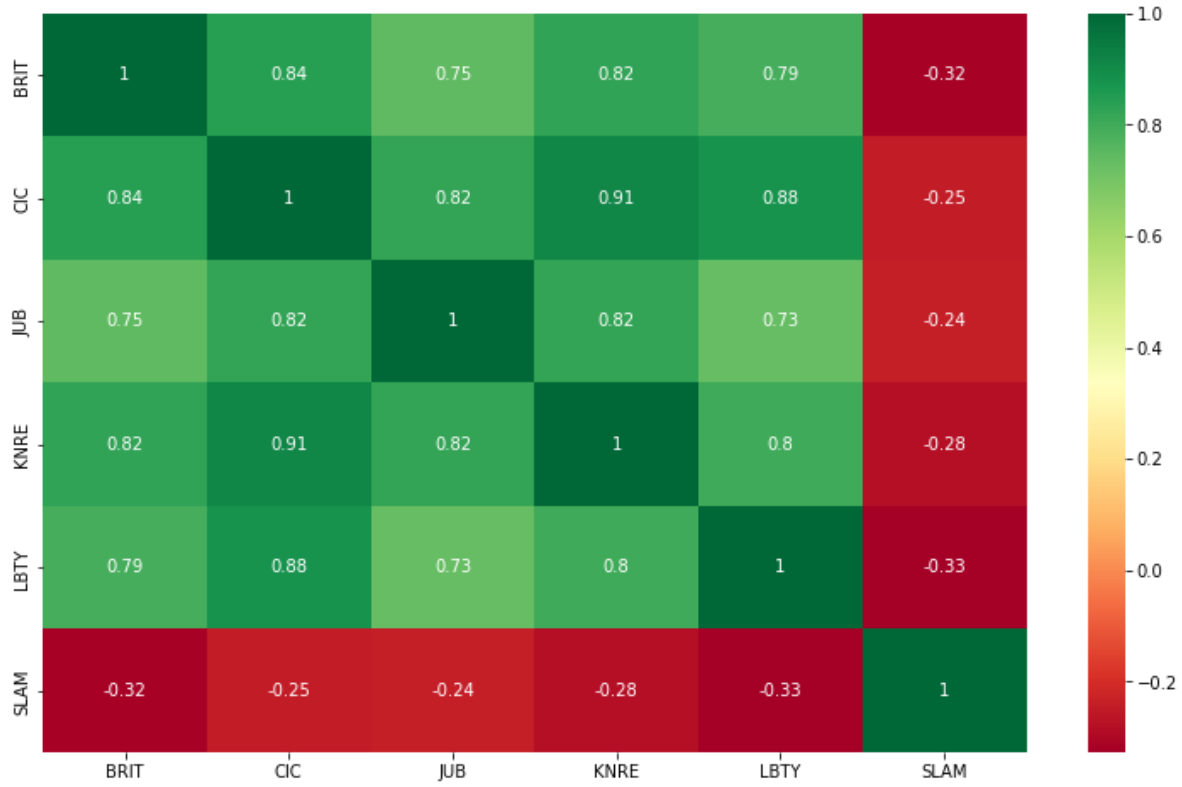
```
corr_df=insur_df.corr(method='pearson')
```

In [59]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[59]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [60]:

```
agric_df.corr(method='pearson')
```

Out[60]:

	EGAD	KUKZ	LIMT	SASN	WTK
EGAD	1.000000	-0.168294	-0.063075	-0.152460	-0.097436
KUKZ	-0.168294	1.000000	-0.422992	-0.192463	-0.374117
LIMT	-0.063075	-0.422992	1.000000	0.345329	0.196757
SASN	-0.152460	-0.192463	0.345329	1.000000	-0.019554
WTK	-0.097436	-0.374117	0.196757	-0.019554	1.000000

In [61]:

```
corr_df=agric_df.corr(method='pearson')
```

In [62]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[62]:

```
<Figure size 432x288 with 0 Axes>
```


```
<Figure size 432x288 with 0 Axes>
```

In [63]:

```
comm_df.corr(method='pearson')
```

Out[63]:

	XPRS	KQ	LKL	NBV	NMG	SMER	SCAN	SGL	TPS
XPRS	1.000000	NaN	0.505657	0.482448	0.564433	0.564130	0.353536	0.456735	-0.1434
KQ	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	Na
LKL	0.505657	NaN	1.000000	0.361295	0.387344	0.318353	0.257131	0.317583	-0.0870
NBV	0.482448	NaN	0.361295	1.000000	0.423817	0.398074	0.508718	0.363434	-0.1538
NMG	0.564433	NaN	0.387344	0.423817	1.000000	0.896570	0.497322	0.879855	-0.2353
SMER	0.564130	NaN	0.318353	0.398074	0.896570	1.000000	0.441286	0.774443	-0.1826
SCAN	0.353536	NaN	0.257131	0.508718	0.497322	0.441286	1.000000	0.296204	0.3447
SGL	0.456735	NaN	0.317583	0.363434	0.879855	0.774443	0.296204	1.000000	-0.3406
TPSE	-0.143478	NaN	-0.087045	-0.153862	-0.235356	-0.182699	0.344714	-0.340694	1.0000
UCHM	0.310362	NaN	0.142561	0.334953	0.575009	0.542615	0.004806	0.633963	-0.4552

In [64]:

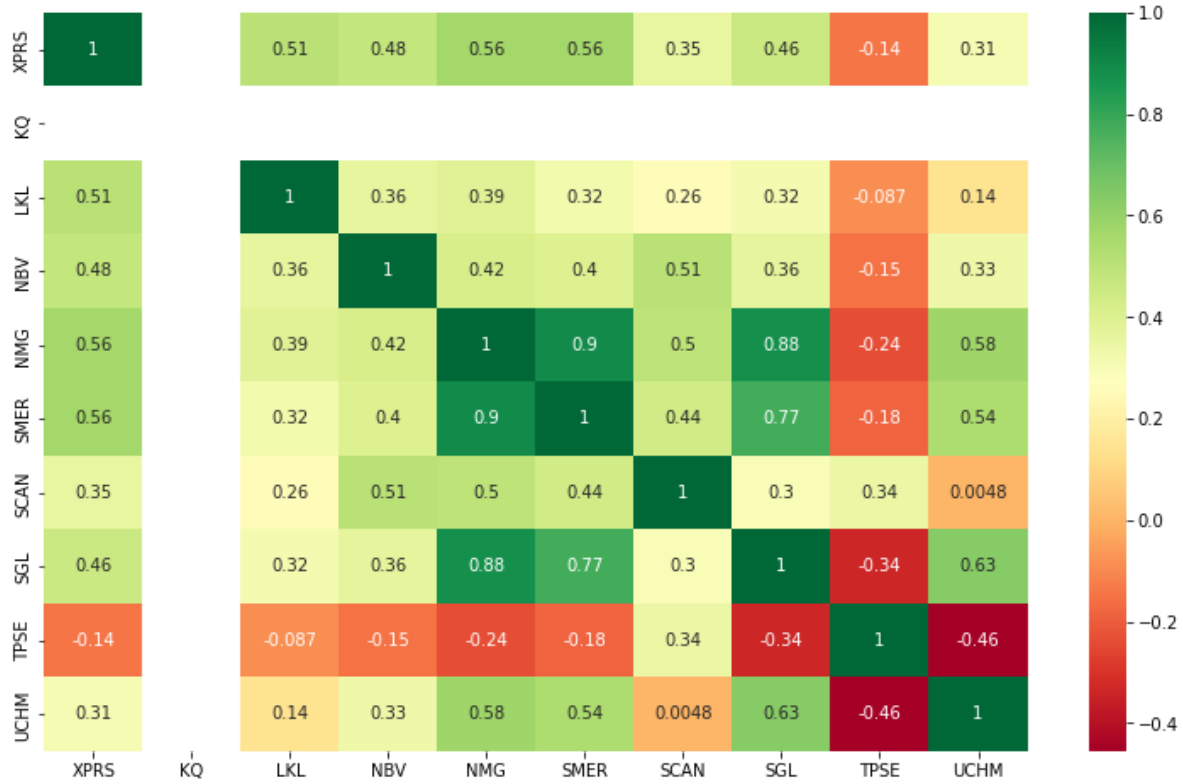
```
corr_df=comm_df.corr(method='pearson')
```

In [65]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[65]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [66]:

```
bank_df.corr(method='pearson')
```

Out[66]:

	ABSA	BKG	DTK	EQTY	HFCK	IMH	KCB	NBK	NCI
ABSA	1.000000	-0.247357	-0.367356	0.051548	0.089564	-0.497121	-0.242094	NaN	-0.0713
BKG	-0.247357	1.000000	0.733606	0.431693	-0.363877	0.685030	0.722452	NaN	0.5461
DTK	-0.367356	0.733606	1.000000	0.377873	-0.472187	0.907300	0.865433	NaN	0.8263
EQTY	0.051548	0.431693	0.377873	1.000000	0.177967	0.468084	0.661149	NaN	0.3330
HFCK	0.089564	-0.363877	-0.472187	0.177967	1.000000	-0.312478	-0.263884	NaN	-0.5224
IMH	-0.497121	0.685030	0.907300	0.468084	-0.312478	1.000000	0.850515	NaN	0.7483
KCB	-0.242094	0.722452	0.865433	0.661149	-0.263884	0.850515	1.000000	NaN	0.7613
NBK	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
NCBA	-0.071353	0.546149	0.826353	0.333037	-0.522405	0.748388	0.761396	NaN	1.0000
SBIC	-0.079066	0.160496	0.079410	0.173888	0.199610	0.159981	0.163069	NaN	0.1344
SCBK	-0.211586	0.769506	0.751985	0.495452	-0.288670	0.746789	0.679501	NaN	0.7191
COOP	-0.367982	0.777537	0.946788	0.484453	-0.469807	0.872273	0.902445	NaN	0.7715

In [67]:

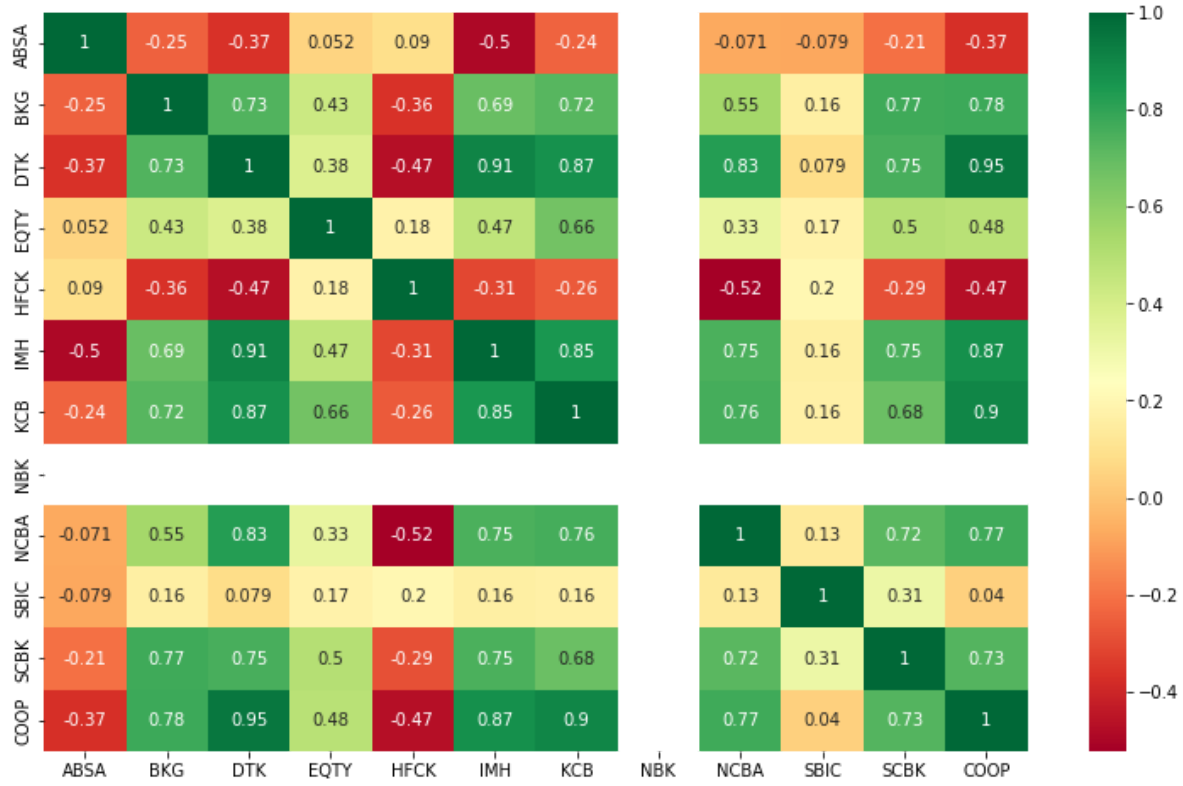
```
corr_df=bank_df.corr(method='pearson')
```

In [68]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[68]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [69]:

```
const_df.corr(method='pearson')
```

Out[69]:

	ARM	BAMB	CRWN	CABL	PORT
ARM	NaN	NaN	NaN	NaN	NaN
BAMB	NaN	1.000000	-0.395628	0.595477	0.607416
CRWN	NaN	-0.395628	1.000000	-0.147204	-0.315659
CABL	NaN	0.595477	-0.147204	1.000000	0.703981
PORT	NaN	0.607416	-0.315659	0.703981	1.000000

In [70]:

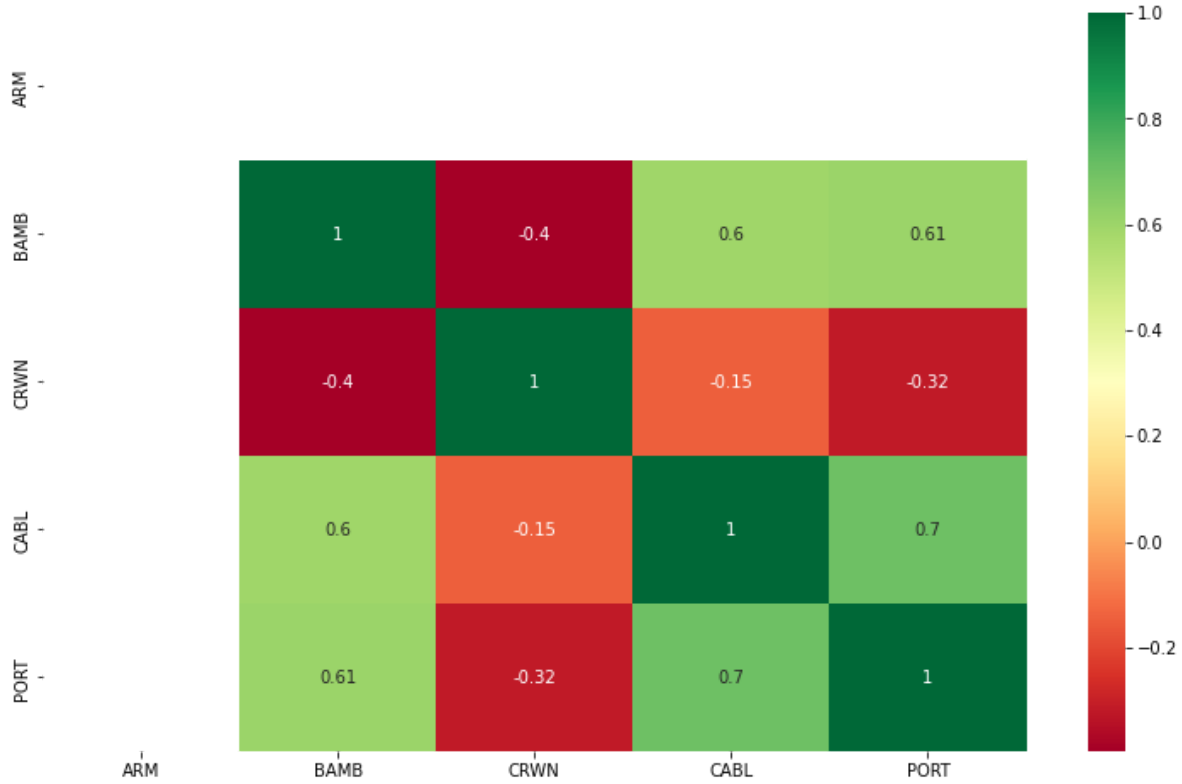
```
corr_df=const_df.corr(method='pearson')
```

In [71]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[71]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [72]:

```
energ_df.corr(method='pearson')
```

Out[72]:

	KEGN	KPLC	TOTL	UMME
KEGN	1.000000	0.104530	0.450142	0.206669
KPLC	0.104530	1.000000	-0.161972	-0.062976
TOTL	0.450142	-0.161972	1.000000	0.130735
UMME	0.206669	-0.062976	0.130735	1.000000

In [73]:

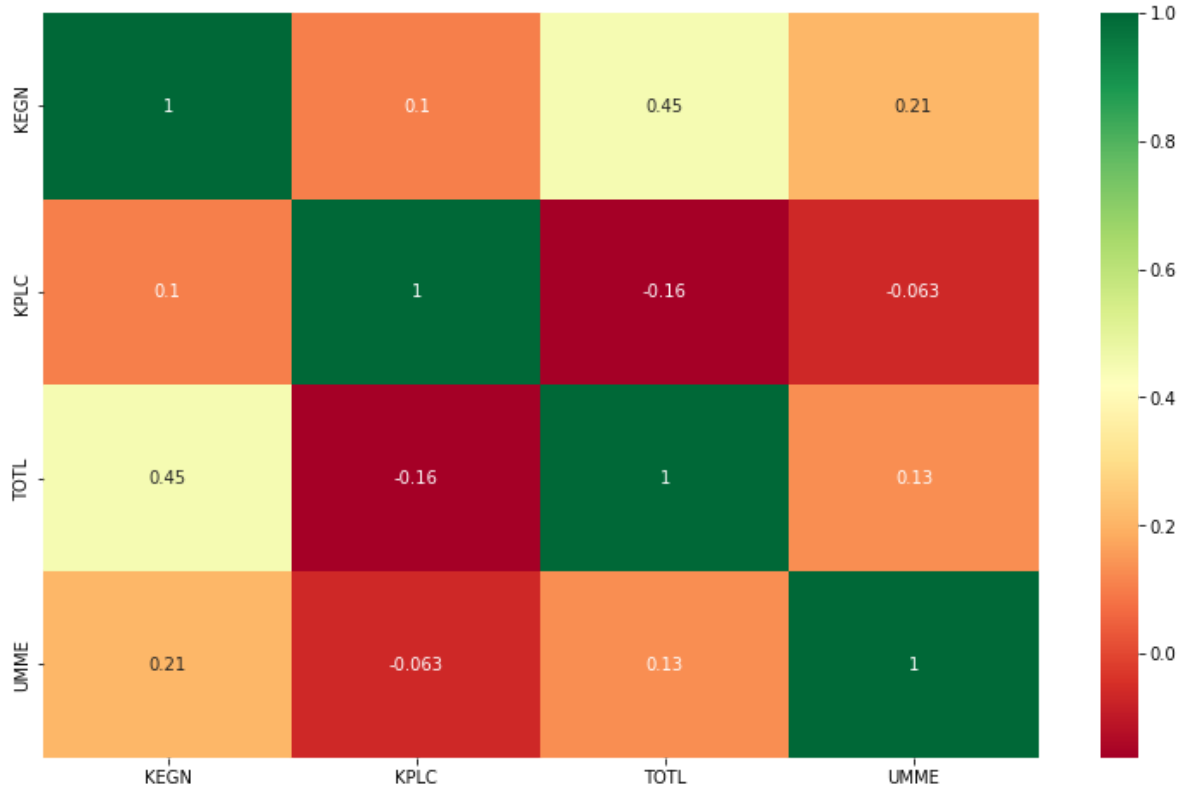
```
corr_df=energ_df.corr(method='pearson')
```

In [74]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[74]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [75]:

```
invest_df.corr(method='pearson')
```

Out[75]:

	CTUM	HAFR	KURV	OCH	TCL	NSE
CTUM	1.000000	0.102660	NaN	0.201916	0.461223	0.568061
HAFR	0.102660	1.000000	NaN	0.021208	0.181057	0.011877
KURV	NaN	NaN	NaN	NaN	NaN	NaN
OCH	0.201916	0.021208	NaN	1.000000	0.083212	0.524421
TCL	0.461223	0.181057	NaN	0.083212	1.000000	0.381206
NSE	0.568061	0.011877	NaN	0.524421	0.381206	1.000000

In [76]:

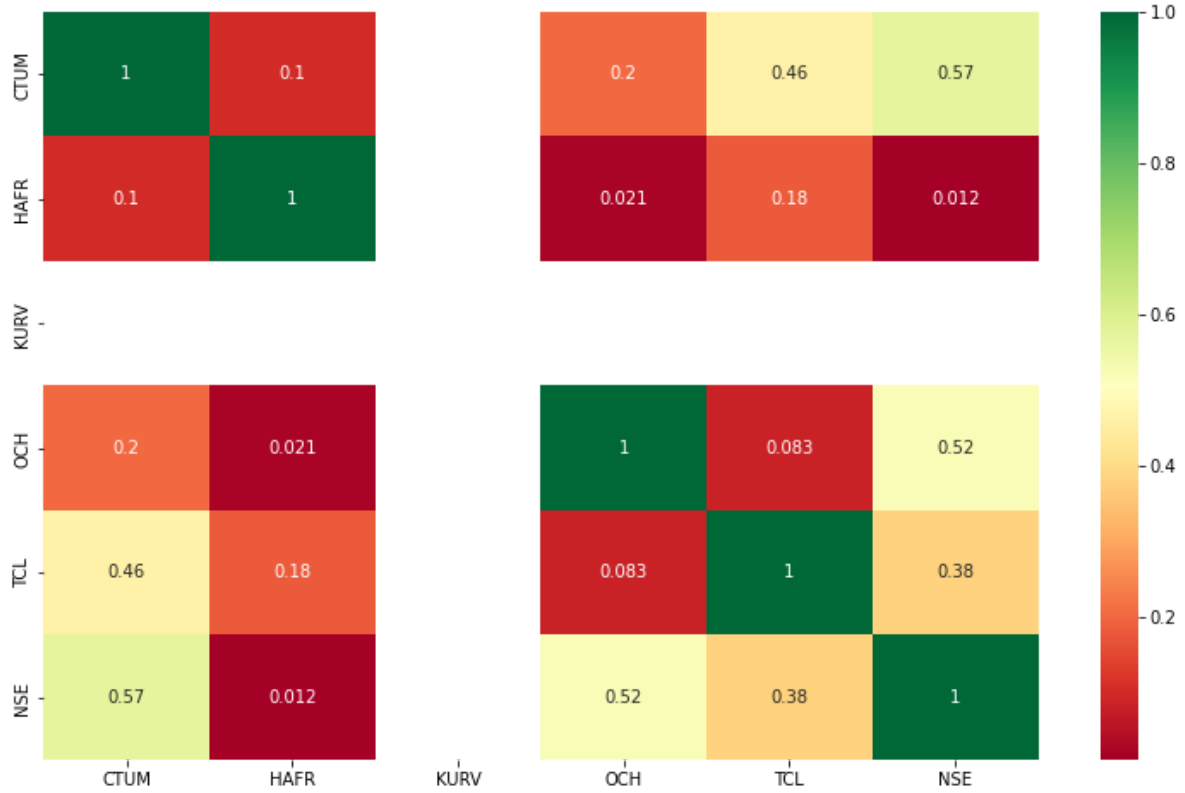
```
corr_df=invest_df.corr(method='pearson')
```

In [77]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[77]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [78]:

```
manu_df.corr(method='pearson')
```

Out[78]:

	BOC	BAT	CARB	EABL	EVRD	FTGH	ORCH	MSC	UNGA
BOC	1.000000	-0.264702	-0.390657	-0.351283	0.147241	0.124104	NaN	NaN	-0.213949
BAT	-0.264702	1.000000	-0.184494	0.816630	0.187274	0.109096	NaN	NaN	0.802586
CARB	-0.390657	-0.184494	1.000000	0.146387	-0.317406	-0.095847	NaN	NaN	-0.007650
EABL	-0.351283	0.816630	0.146387	1.000000	0.128904	0.141361	NaN	NaN	0.753815
EVRD	0.147241	0.187274	-0.317406	0.128904	1.000000	0.187224	NaN	NaN	0.101246
FTGH	0.124104	0.109096	-0.095847	0.141361	0.187224	1.000000	NaN	NaN	0.243746
ORCH	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
MSC	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
UNGA	-0.213949	0.802586	-0.007650	0.753815	0.101246	0.243746	NaN	NaN	1.000000

In [79]:

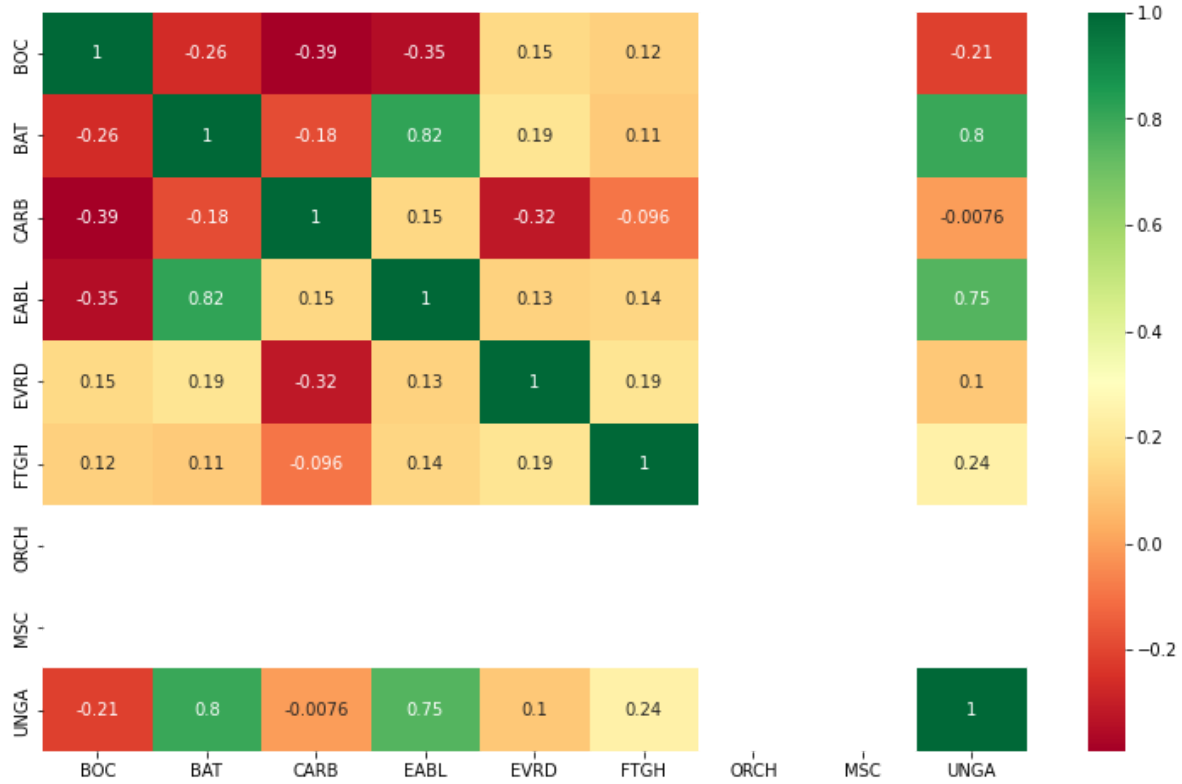
```
corr_df=manu_df.corr(method='pearson')
```

In [80]:

```
plt.figure(figsize=(13, 8))
sns.heatmap(corr_df, annot=True, cmap='RdYlGn')
plt.figure()
```

Out[80]:

```
<Figure size 432x288 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

In [ ]:

Getting Started with Python

Vehicle Analysis Project

Author : Rebecca Njonjo

Date: 26/3/2022

Resources

1. #### Vehicle Dataset
2. #### Submission Portal

If you are having problems please refer to this document:

1. #### Data Analysis with Python Pandas Notebook

Instructions

Import all the libraries listed in the first cell. Make sure all modules are installed.

Use the provided data set to answer the following:

Use `pandas` to come up with:

1. The titles and prices of **10** Cars with highest price
2. The titles and prices of 5 Buses & Microbuses with highest price
3. The titles and prices of 5 Trucks & Trailers with highest price

Plotting

Use **matplotlib** to come up with a plot indicating the **top 10 brands** that we have in the vehicle_dataset

Key performance Metrics:

- Ensure all the plots have a Title
- Ensure all plots have x labels and y labels where applicable
- Your plots should be clearly visible. Change the size of your plot to a comfortable width and height.

- Save all your plots

In [1]:
```
import os
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:
```
os.listdir()
```

Out[2]:
```
['.ipynb_checkpoints',
 'AMOS DOC..docx',
 'AutoCAD_2022_English_Win_64bit_di_en-US_setup_webinstall.exe',
 'Basic DC generator equations.pdf',
 'CAT (1).pdf',
 'CAT.pdf',
 'clean_stock_prices.csv',
 'codeblocks-20.03-setup.exe',
 'DC Motors.pdf',
 'desktop.ini',
 'Document7 (2).pdf',
 'Downloads - Shortcut.lnk',
 'Efficiency and Power.pdf',
 'Final_Project.pdf',
 'Induction motors.pdf',
 'introductory letter.pdf',
 'Inventor_2022_ENUX64_DI_en-US_setup_webinstall.exe',
 'Jack Donovan - The Way of Men (2012, Dissonant Hum) - libgen.lc.pdf',
 'Lecture 3 Springs.pdf',
 'lecture 4 notes.pdf',
 'Lecture 4 Threaded fasteners.pdf',
 'Lecture 5 - Welds part 1.pdf',
 'Lecture 5.docx',
 'Lecture 5.docx.pdf',
 'Lecture 6 - Welds part 2.pdf',
 'Lecture 6&7 (1).docx',
 'Lecture 6&7.docx',
 'Lecture 8 (1).docx',
 'Lecture 8.docx',
 'Lecture 9&10 (1).pdf',
 'Lecture 9&10.pdf',
 'matlab_R2021b_win64.exe',
 'mysql-installer-web-community-8.0.28.0.msi',
 'Power Amplifiers.pdf',
 'project-time-series-workbook.ipynb',
 'python-3.10.2-amd64.exe',
 'python-for-data-science-sample-submission.pdf',
 'Python_Week_One_Project (1).pdf',
 'Python_Week_One_Project (2).pdf',
 'Python_Week_One_Project.pdf',
 'R Lesson 2.pptx',
 'R-4.1.3-win.exe',
 'R-and-R-Studio-Installation (1) (1).pdf',
 'R-and-R-Studio-Installation (1) (2).pdf',
 'R-and-R-Studio-Installation (1).pdf',
 'Revit_2022_Ship_20210224_RTC_Win_64bit_di_ML_setup_webinstall.exe',
 'Rollo Tomassi - The Rational Male-CreateSpace Independent Publishing Platform (201
3).epub',
 'Rollo Tomassi - The Rational Male-CreateSpace Independent Publishing Platform (201
3).pdf',
 'Series Amplifiers.pdf',
 'student_copy_pandas_workbook.ipynb',
 'TABLE 9.3.docx',
 'TEAM CONTRACTS (1).docx',
 'TEAM CONTRACTS.docx',
 'vehicle_data.csv',
 'vehicle_dataset_project.ipynb',
 '[B07D23CFGR] James Clear - Atomic Habits (2018, Random House Business Books) - libg
en.lc.pdf',
 '[Microelectronics Journal vol. 29 iss. 8] V.B. Kitovski - Electronic devices and ci
```

```
rcuit theory, 6th edition, R. Boylestad and L. Nashelsky, Prentice Hall International
Inc., 1996, 950 p (1998) [10.1016_s0026-2692(.pdf']
```

vehicle_data.csv should be listed in your output from the above cell

In [3]:
```
df = pd.read_csv('vehicle_data.csv')
df.head()
```

Out[3]:

	title	category	region	parent_region	condition	attrs	brand	color	model	yon
0	Toyota Land Cruiser Prado 2016 Black	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults	Toyota	Black	Land Cruiser Prado	2016.
1	Mazda Demio 2014 Brown	Cars	Langata	Nairobi	Foreign Used	First owner, No faults	Mazda	Brown	Demio	2014.
2	Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.
3	Toyota Crown 2014 Pearl	Cars	Kilimani	Nairobi	Foreign Used	No faults	Toyota	Pearl	Crown	2014.
4	Honda Fit 2014 Black	Cars	Mvita	Mombasa	Foreign Used	No faults	Honda	Black	Fit	2014.

As an example I have shown the top 10 most expensive vehicles that are in _parent*region* Mombasa

In [5]:
```
# filter only rows that have Cars as their category
df['category'] == 'Cars'
```

Out[5]:
```
0       True
1       True
2      False
3       True
4       True
       ...
295     True
296    False
297    False
298     True
299     True
Name: category, Length: 300, dtype: bool
```

In [6]:
```
mask = df['category'] == 'Cars'
```

In [7]:
```
# all the rows in the dataFrame that have category cars
cars_df = df[mask].copy()
cars_df.head()
```

Out[7]:

	title	category	region	parent_region	condition	attrs	brand	color	model	y
0	Toyota Land Cruiser Prado 2016 Black	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults	Toyota	Black	Land Cruiser Prado	20
1	Mazda Demio 2014 Brown	Cars	Langata	Nairobi	Foreign Used	First owner, No faults	Mazda	Brown	Demio	20
3	Toyota Crown 2014 Pearl	Cars	Kilimani	Nairobi	Foreign Used	No faults	Toyota	Pearl	Crown	20
4	Honda Fit 2014 Black	Cars	Mvita	Mombasa	Foreign Used	No faults	Honda	Black	Fit	20
5	Mitsubishi Delica 2013 White	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults, Unpainted	Mitsubishi	White	Delica	20

To get the highest price I will use the `nlargest` function

In [8]:
```
# top 10 cars with highest price
cars_df.nlargest(10,'price')
```

Out[8]:

	title	category	region	parent_region	condition	attrs	brand	color	model
22	Lexus RX 2016 Black	Cars	Mombasa CBD	Mombasa	Foreign Used	No faults	Lexus	Black	RX
265	New Hyundai Palisade 2021 White	Cars	Mombasa Road	Nairobi	Brand New	No faults	Hyundai	White	Palisade
224	Toyota Hilux 2016 Black	Cars	Mombasa CBD	Mombasa	Foreign Used	First registration	Toyota	Black	Hilux
156	Toyota Land Cruiser 2010 4.6 V8 ZX Black	Cars	Runda	Nairobi	Foreign Used	No faults	Toyota	Black	Land Cruiser
249	Toyota Land Cruiser 2014 4.6 V8 ZX Black	Cars	Karen	Nairobi	Foreign Used	Unpainted, Original parts, No faults	Toyota	Black	Land Cruiser
0	Toyota Land Cruiser Prado 2016 Black	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults	Toyota	Black	Land Cruiser Prado
53	Toyota Land Cruiser Prado 2015 2.7 VVT-i Brown	Cars	Mvita	Mombasa	Foreign Used	No faults	Toyota	Brown	Land Cruiser Prado
241	BMW X5 2015 White	Cars	Mombasa CBD	Mombasa	Foreign Used	First registration	BMW	White	X5
177	Toyota Land Cruiser Prado 2014 Blue	Cars	Nairobi Central	Nairobi	Foreign Used	First owner, Unpainted, Original parts	Toyota	Blue	Land Cruiser Prado
8	BMW X4 2015 xDrive35i Black	Cars	Mombasa CBD	Mombasa	Foreign Used	No faults	BMW	Black	X4

To get only the `titles`

In [10]:
```
# top 10 vehicles with highest price
cars_df.nlargest(10,'price')[['title','category','price']]
```

Out[10]:

	title	category	price
22	Lexus RX 2016 Black	Cars	14500000
265	New Hyundai Palisade 2021 White	Cars	9500000
224	Toyota Hilux 2016 Black	Cars	9000000
156	Toyota Land Cruiser 2010 4.6 V8 ZX Black	Cars	8799999
249	Toyota Land Cruiser 2014 4.6 V8 ZX Black	Cars	8199999
0	Toyota Land Cruiser Prado 2016 Black	Cars	6500000
53	Toyota Land Cruiser Prado 2015 2.7 VVT-i Brown	Cars	6500000
241	BMW X5 2015 White	Cars	6300000
177	Toyota Land Cruiser Prado 2014 Blue	Cars	6150000
8	BMW X4 2015 xDrive35i Black	Cars	5800000

In [11]:
```
df["category"]=="Buses & Microbuses"
```

Out[11]:
```
0      False
1      False
2       True
3      False
4      False
       ...
295    False
296    False
297    False
298    False
299    False
Name: category, Length: 300, dtype: bool
```

In [12]:
```
mask=df["category"]=="Buses & Microbuses"
```

In [15]:
```
buses_df=df[mask].copy()
buses_df.head()
```

Out[15]:

	title	category	region	parent_region	condition	attrs	brand	color	model	yor
2	Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.
25	Nissan Van	Buses & Microbuses	Machakos Town	Machakos	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.
26	Nissan NV200 2015 White	Buses & Microbuses	Changamwe	Mombasa	Foreign Used	Nissan	Nissan	NaN	NV200	2015.
34	Toyota Hiace Box Petrol on Sale	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Toyota	Toyota	Grey	HiAce	2008.
55	Chopper 9L Hiace	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	Grand HiAce	2015.

In [17]:
```
# top 5 buses and microbuses with highest price
buses_df.nlargest(5,'price')
```

Out[17]:

	title	category	region	parent_region	condition	attrs	brand	color	mode
148	Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo
221	Selling Buses In Mombasa Town	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mitsubishi	Mitsubishi	NaN	Fus Ros
174	Roller Coaster	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	Coaste
211	Toyota Coaster 2014 White	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	Coaste
268	Toyota Hiace 2015 White	Buses & Microbuses	Ziwa la Ngombe	Nyali	Brand New	Toyota	Toyota	NaN	HiAc

In [19]:
```
# top 5 buses and microbuses with highest price

buses_df.nlargest(5,'price')[['title','category','price']]
```

Out[19]:

	title	category	price
148	Mazda Bongo	Buses & Microbuses	11200000
221	Selling Buses In Mombasa Town	Buses & Microbuses	5200000
174	Roller Coaster	Buses & Microbuses	4900000
211	Toyota Coaster 2014 White	Buses & Microbuses	4300000
268	Toyota Hiace 2015 White	Buses & Microbuses	3800000

In [21]:
```
df["category"]=="Trucks & Trailers"
```

Out[21]:
```
0      False
1      False
2      False
3      False
4      False
       ...
295    False
296     True
297     True
298    False
299    False
Name: category, Length: 300, dtype: bool
```

In [ ]:
```
mask=df["category"]=="Trucks & Trailers"
```

In [22]:
```
trucks_df=df[mask].copy()
trucks_df.head()
```

Out[22]:

	title	category	region	parent_region	condition	attrs	brand	color	model	yor
2	Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.
25	Nissan Van	Buses & Microbuses	Machakos Town	Machakos	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.
26	Nissan NV200 2015 White	Buses & Microbuses	Changamwe	Mombasa	Foreign Used	Nissan	Nissan	NaN	NV200	2015.
34	Toyota Hiace Box Petrol on Sale	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Toyota	Toyota	Grey	HiAce	2008.
55	Chopper 9L Hiace	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	Grand HiAce	2015.

The above output is what the question is asking for. So take a screenshot.

In [23]:
```
trucks_df.nlargest(5,"price")
```

Out[23]:

	title	category	region	parent_region	condition	attrs	brand	color	mode
148	Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo
221	Selling Buses In Mombasa Town	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mitsubishi	Mitsubishi	NaN	Fuso Ros
174	Roller Coaster	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	Coaste
211	Toyota Coaster 2014 White	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	Coaste
268	Toyota Hiace 2015 White	Buses & Microbuses	Ziwa la Ngombe	Nyali	Brand New	Toyota	Toyota	NaN	HiAc

In [25]:
```
trucks_df.nlargest(5,"price")[["category","title","price"]]
```

Out[25]:

	category	title	price
148	Buses & Microbuses	Mazda Bongo	11200000
221	Buses & Microbuses	Selling Buses In Mombasa Town	5200000
174	Buses & Microbuses	Roller Coaster	4900000
211	Buses & Microbuses	Toyota Coaster 2014 White	4300000
268	Buses & Microbuses	Toyota Hiace 2015 White	3800000

Plotting

I will demonstrate how to solve the plotting challenge using the following question:

Use **matplotlib** to come up with a plot indicating the **top 5 regions** that we have in the vehicle_dataset

In [27]:
```
# get number of rows with vehicle brands
df['brand'].value_counts()
```

Out[27]:
```
Toyota           82
Nissan           33
Mitsubishi       32
Mazda            26
Subaru           22
Volkswagen       21
Isuzu            19
Honda            17
BMW              17
Mercedes-Benz     9
Suzuki            5
Lexus             4
Tata              2
Volvo             2
Ashok Leyland     2
Land Rover        1
Shacman           1
Other             1
Hyundai           1
Daihatsu          1
Audi              1
Name: brand, dtype: int64
```

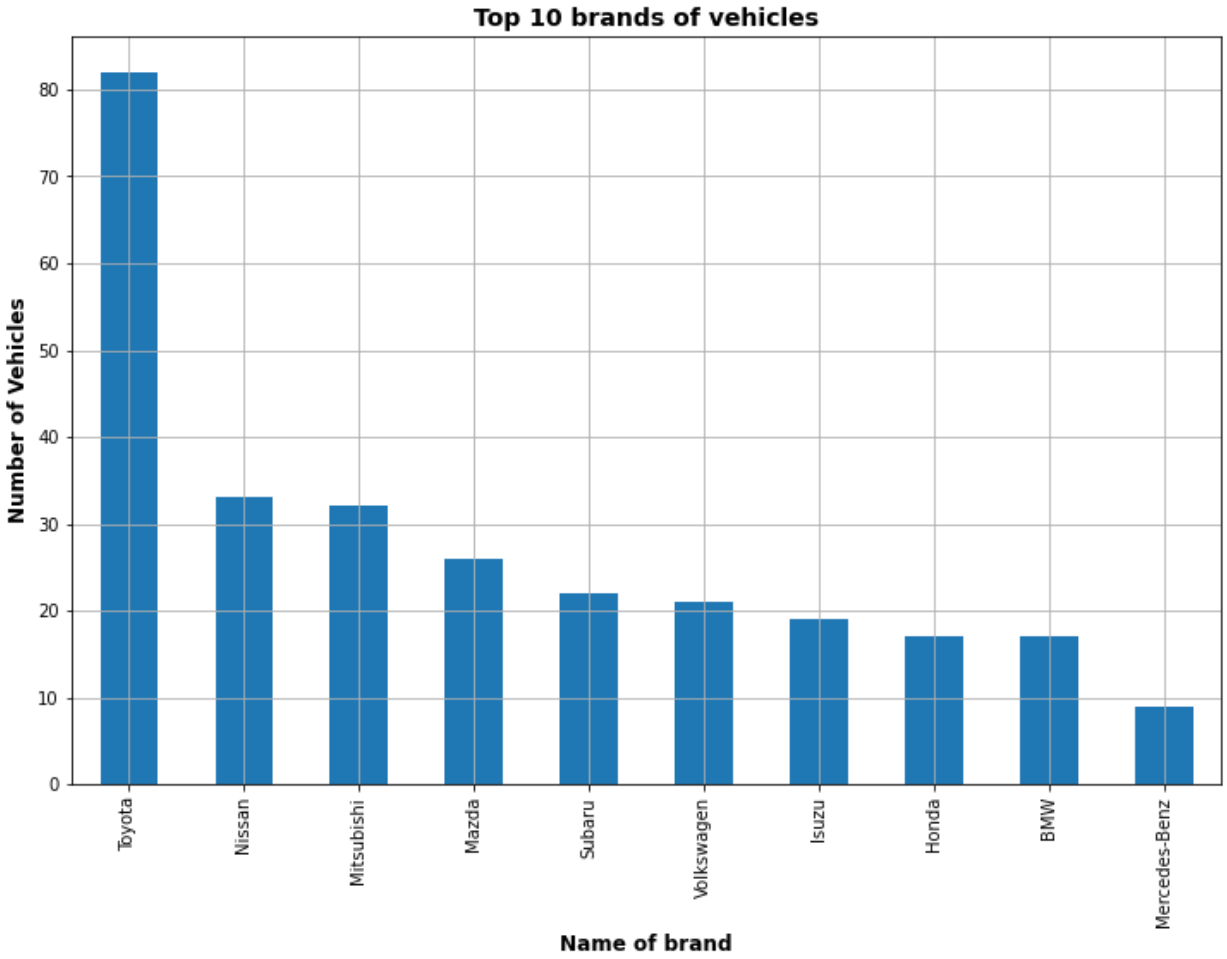
In [28]:
```
# grab the top 10
df['brand'].value_counts()[:10]
```

Out[28]:
```
Toyota           82
Nissan           33
Mitsubishi       32
Mazda            26
Subaru           22
Volkswagen       21
Isuzu            19
Honda            17
BMW              17
Mercedes-Benz     9
Name: brand, dtype: int64
```

In [30]:
```
# make it a variable
top_10 = df['brand'].value_counts()[:10]
```

Now to create a bar plot of the top 5 regions

In [32]:
```
plt.figure(figsize=(12,8))
plt.title("Top 10 brands of vehicles", fontsize=14, fontweight='bold')
top_10.plot.bar()
plt.xlabel('Name of brand',fontsize=12, fontweight='bold')
plt.ylabel('Number of Vehicles',fontsize=12, fontweight='bold')
plt.grid()

# save the plot to file
fig = plt.gcf()
fig.savefig('top-10-brands.png')

plt.show()
```


Top 10 brands of vehicles
Number of Vehicles
0
10
20
30
40
50
60
70
80
Toyota
Nissan
Mitsubishi
Mazda
Subaru
Volkswagen
Isuzu
Honda
BMW
Mercedes-Benz
Name of brand

In [ ]: