

Getting Started with Python

Time Series Project

Author : WAMBUI PRAISE KIGURU

Date: 17/3/2022

Resources

1. ##### [Clean Dataset](#)
2. ##### [Submission Portal](#)

If you are having problems please refer to this document:

1. ##### [Time Series 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:

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.

Key performance Metrics:

- 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.
- Save all your plots

```
In [2]: 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 [3]: os.listdir()
```

```
Out[3]: ['.ipynb_checkpoints',
'303_report.pdf',
'307 Lecture 1.pdf',
'307 Lecture 3.pdf',
'activity 2.10',
'activity 2.6',
'ACTIVITY_6',
'ADVANCED CALCULUS.jpeg',
'application form.pdf',
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'A_SPH 308_Lec1.pptx',
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'Blackish S06E20(toxicwap.com).mp4',
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'Chapter_3_Slides.pdf',
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```

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'Orthogonality-7-Orthogonal Projections(3).pdf',
'Orthogonality-8-Computation of least square solutions(4).pdf',
'Orthogonality-9-Inner product spaces(4).pdf',
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'SMA303_Lectures_update.pdf',
'SMA321-Modeling.pdf',
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'student_copy_pandas_workbook (2).ipynb',
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```
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'WhatsApp Image 2020-11-25 at 10.22.49 (2).jpeg',
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```

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

```
Out[5]:
```

	EGAD	KUKZ	LIMIT	SASN	WTK	CGEN	ABSA	BKG	DTK	EQTY	...	BAT	CARB	EABL	EVRD	FT
Date																
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	10.80	151.50	0.96	
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	10.85	161.00	0.88	
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	10.90	164.75	0.94	
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	10.90	160.75	0.99	
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	10.90	163.75	0.99	

5 rows x 60 columns

```
In [8]: df.tail()
```

```
Out[8]:
```

	EGAD	KUKZ	LIMIT	SASN	WTK	CGEN	ABSA	BKG	DTK	EQTY	...	BAT	CARB	EABL	EVRD	FT
Date																
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	12.25	179.25	0.96	
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	12.25	179.00	0.98	
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	12.20	178.50	0.98	
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	12.00	179.75	0.98	
2021-	11.80	415.0	304.75	19.95	134.5	35.0	9.82	29.50	65.00	49.00	...	450.0	12.00	180.00	0.98	

5 rows × 60 columns

Use this part to answer questions 1, 2 and 3

```
In [19]: # lowest price for Safaricom
df['SCOM'].nsmallest(1,)
```

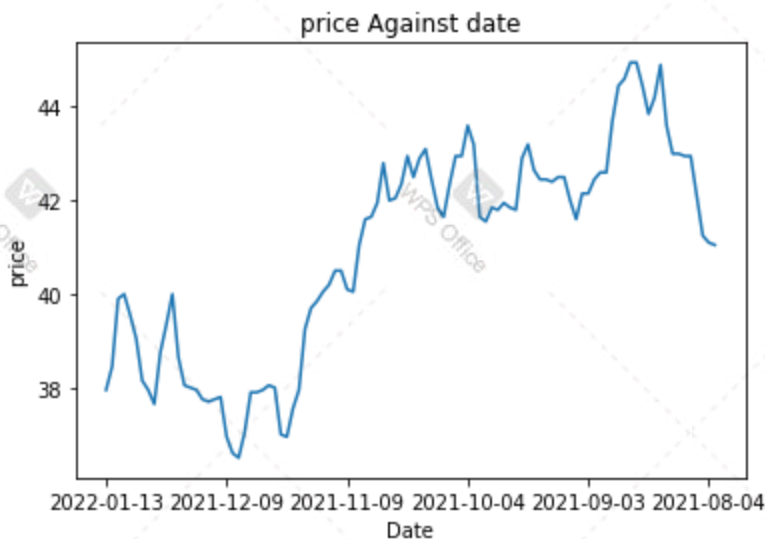
```
Out[19]: Date
2021-12-07    36.5
Name: SCOM, dtype: float64
```

```
In [20]: # highest price for Safaricom
df['SCOM'].nlargest(1,)
```

```
Out[20]: Date
2021-08-24    44.95
Name: SCOM, dtype: float64
```

```
In [22]: # Plot SCOM to confirm above observations
df['SCOM'].plot()
plt.ylabel("price")
plt.title("price Against date")
```

```
Out[22]: Text(0.5, 1.0, 'price Against date')
```



Use this part to answer question 4

```
In [23]: # agricultural 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']

# investment 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 [25]: manu_df = df.loc[:, 'BOC': 'UNGA'].copy()
manu_df.head()

```

```

Out[25]:

```

	BOC	BAT	CARB	EABL	EVRD	FTGH	ORCH	MSC	UNGA
Date									
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 [26]: sector_name_df = manu_df.copy()
sector_name_df.head()

```

```

Out[26]:

```

	BOC	BAT	CARB	EABL	EVRD	FTGH	ORCH	MSC	UNGA
Date									
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

```

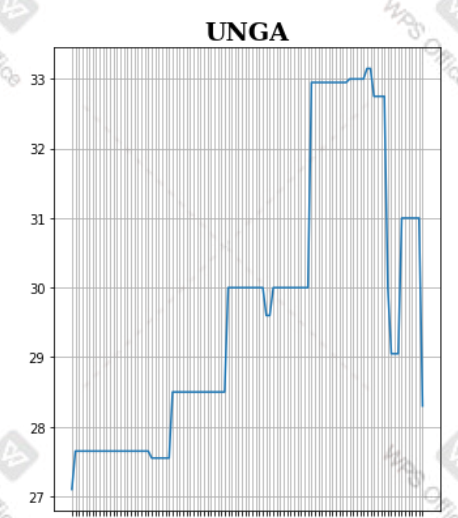
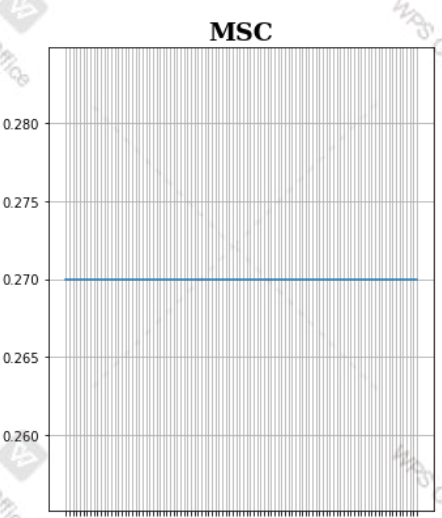
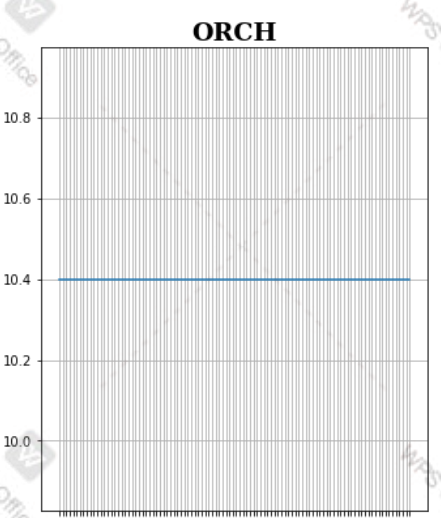
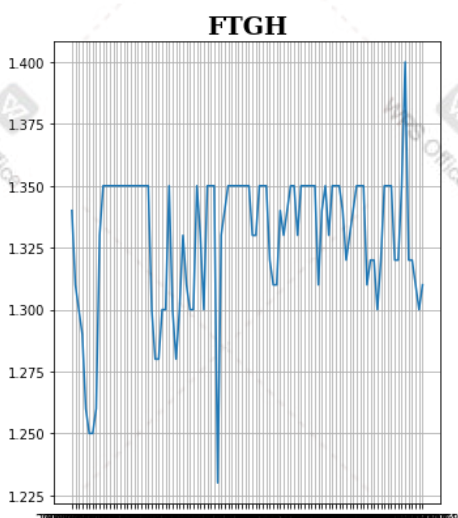
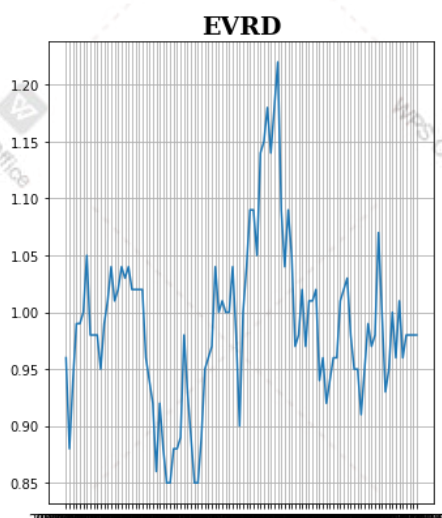
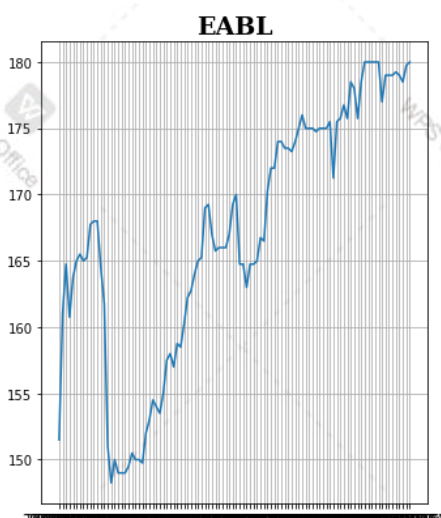
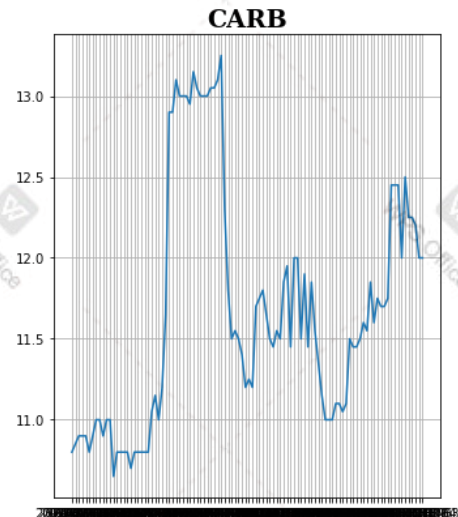
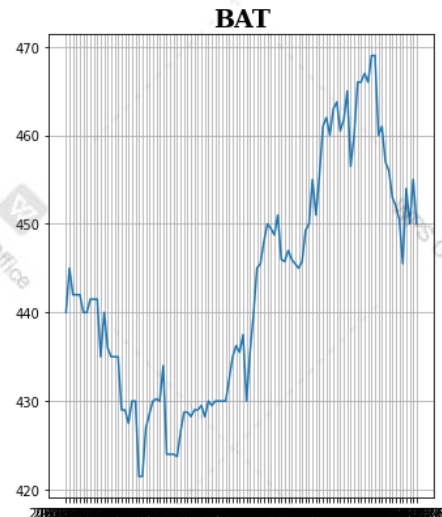
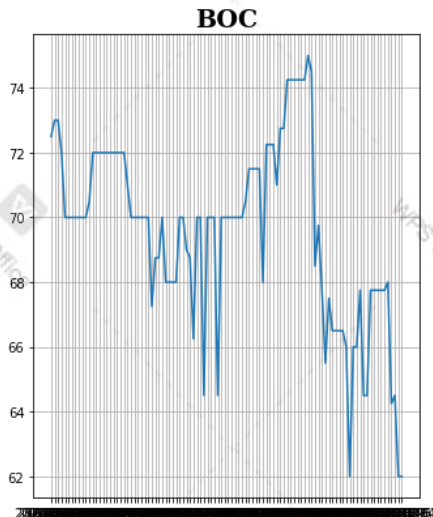
In [28]: manu_cols = sector_name_df.columns

font = {'family': 'serif',
        'color': 'black',
        'weight': 'heavy',
        'size': 19,
        }

for idx, manu in enumerate(manu_cols, start=1):
    plt.subplot(4, 3, idx)
    plt.title(manu, fontdict=font)
    plt.grid()
    plt.plot(manu, data=sector_name_df)

fig = plt.gcf()
fig.set_size_inches(18, 30)
plt.show()

```



In [29]: `sector_name_df.corr(method='pearson')`

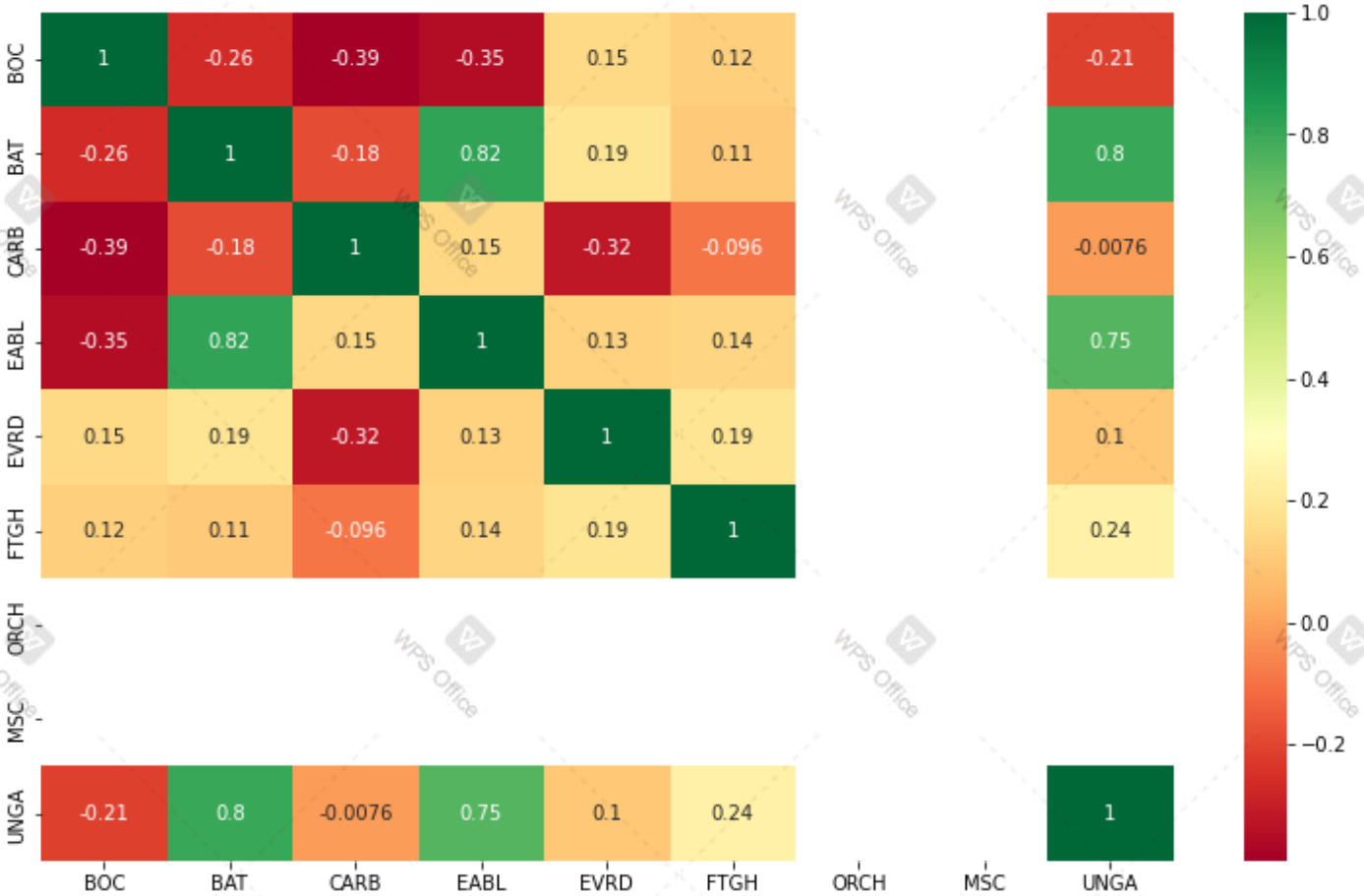
Out[29]:

	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 [30]: plt.figure(figsize=(13, 8))
sns.heatmap(sector_name_df.corr(method='pearson'), annot=True, cmap='RdYlGn')
plt.figure()
```

Out[30]: <Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

Getting Started with Python

VEHICLE DATA Project

Author : WAMBUI PRAISE KIGURU

Date: 17/3/2022

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import pandas as pd
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import seaborn as sns
```

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```
In [32]: os.listdir()
```

```
Out[32]: ['.ipynb_checkpoints',
'303_report.pdf',
'307 Lecture 1.pdf',
'307 Lecture 3.pdf',
'activity 2.10',
'activity 2.6',
'ACTIVITY_6',
'ADVANCED CALCULUS.jpeg',
'application form.pdf',
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'Handout I_Python programming for physicists.pdf',
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'HOMEWORK 7.pdf',
'ID (2).pdf',
'id.pdf',
'Identification.pdf',
'Introduction_to_vectors.pdf',
'INV-252389.pdf',
'kagu ID.pdf',
'KIGURU_5ACTIVITY_7',
'kyle birth.pdf',
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'Notes_Babarosa.pdf',
'Notes_Intro_modeling.pdf',
'Order #429826_Robinson Crusoe by Daniel Defoe (1).docx',
'Order #429826_Robinson Crusoe by Daniel Defoe.docx',
'Orthogonality-7-Orthogonal Projections(3).pdf',
'Orthogonality-8-Computation of least square solutions(4).pdf',
'Orthogonality-9-Inner product spaces(4).pdf',
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'Orthogonality-TheDotProduct(4).pdf',
'PPASS.pdf',
'project-time-series-workbook.ipynb',
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'pycharm-professional-2021.3.2.exe',
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'python-3.10.2-amd64.exe',
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```

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 [34]: df = pd.read_csv('vehicle_data.csv', index_col=0)
df.head()
```

```
Out[34]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	bo
Toyota Land Cruiser Prado 2016 Black	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults	Toyota	Black	Land Cruiser Prado	2016.0	87000.0	
Mazda Demio 2014 Brown	Cars	Langata	Nairobi	Foreign Used	First owner, No faults	Mazda	Brown	Demio	2014.0	92000.0	
Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.0	180000.0	
Toyota Crown 2014 Pearl	Cars	Kilimani	Nairobi	Foreign Used	No faults	Toyota	Pearl	Crown	2014.0	75000.0	
Honda Fit 2014 Black	Cars	Mvita	Mombasa	Foreign Used	No faults	Honda	Black	Fit	2014.0	58000.0	

```
In [35]: df.tail()
```

```
Out[35]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	milea
--	----------	--------	---------------	-----------	-------	-------	-------	-------	-----	-------

title	category	region	parent_region	condition	attrs	brand	color	model	yom	mile
Toyota Allion 2008 Silver	Cars	Ganjoni	Mombasa	Kenyan Used	No faults	Toyota	Silver	Allion	2008.0	17654
Mitsubishi Hd	Trucks & Trailers	Kisauni	Mombasa	Used	Used	Mitsubishi	NaN	NaN	2006.0	NaN
Mitsubishi Fuso Refrigerated	Trucks & Trailers	Kisauni	Mombasa	Used	Used	Mitsubishi	NaN	Canter	2014.0	NaN
Toyota Ractis 2009 Black	Cars	Ridgeways	Nairobi	Kenyan Used	First owner, No faults, Original parts	Toyota	Black	Ractis	2009.0	120120
Subaru Forester 2015 Matt Black	Cars	Mombasa CBD	Mombasa	Foreign Used	Unpainted, Original parts, First registration	Subaru	Matt Black	Forester	2015.0	86910

Use this part to answer questions 1, 2 and 3

```
In [36]: # titles and prices of 10 Cars with highest price
df.nlargest(10, 'price')
```

```
Out[36]:
```

title	category	region	parent_region	condition	attrs	brand	color	model	yom	mile
Lexus RX 2016 Black	Cars	Mombasa CBD	Mombasa	Foreign Used	No faults	Lexus	Black	RX	2016.0	NaN
Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo	2014.0	1278
New Hyundai Palisade 2021 White	Cars	Mombasa Road	Nairobi	Brand New	No faults	Hyundai	White	Palisade	2021.0	2
Toyota Hilux 2016 Black	Cars	Mombasa CBD	Mombasa	Foreign Used	First registration	Toyota	Black	Hilux	2016.0	360
Toyota Land Cruiser 2010 4.6 V8 ZX Black	Cars	Runda	Nairobi	Foreign Used	No faults	Toyota	Black	Land Cruiser	2010.0	NaN
Toyota Land Cruiser 2014 4.6 V8 ZX Black	Cars	Karen	Nairobi	Foreign Used	Unpainted, Original parts, No faults	Toyota	Black	Land Cruiser	2014.0	300
Mercedes-	Trucks &	Thome	Nairobi	Used	Used	Mercedes-	NaN	NaN	2013.0	NaN

	Trailers							Benz				
Toyota Land Cruiser Prado 2016 Black	Cars	Mvita	Mombasa	Foreign Used	First registration, No faults	Toyota	Black	Land Cruiser Prado	2016.0	87C		
Toyota Land Cruiser Prado 2015 2.7 VVT-i Brown	Cars	Mvita	Mombasa	Foreign Used	No faults	Toyota	Brown	Land Cruiser Prado	2015.0	452		
BMW X5 2015 White	Cars	Mombasa CBD	Mombasa	Foreign Used	First registration	BMW	White	X5	2015.0	68C		

```
In [43]: #titles and prices of 5 Buses & Microbuses with highest price
mask = df['category'] == 'Buses & Microbuses'
df[mask]
```

Out[43]:	category	region	parent_region	condition	attrs	brand	color	model	yom	mile		
Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.0	180C		
Nissan Van	Buses & Microbuses	Machakos Town	Machakos	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.0	267C		
Nissan NV200 2015 White	Buses & Microbuses	Changamwe	Mombasa	Foreign Used	Nissan	Nissan	NaN	NV200	2015.0	112C		
Toyota Hiace Box Petrol on Sale	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Toyota	Toyota	Grey	HiAce	2008.0	1787		
Chopper 9L Hiace	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	Grand HiAce	2015.0	101C		
Nissan Nv350	Buses & Microbuses	Mbaraki	Mombasa	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.0	91C		
Suzuki Every Van 2014	Buses & Microbuses	Nairobi	NaN	Foreign Used	Suzuki	Suzuki	White	Every	2014.0			
Toyota Matatu on Sale	Buses & Microbuses	Nakuru Town East	Nakuru	Kenyan Used	Toyota	Toyota	NaN	Grand HiAce	2009.0	170C		
Toyota HiAce	Buses & Microbuses	Mvita	Mombasa	Foreign Used	Toyota	Toyota	Silver	HiAce	2013.0	984		

**2013
Silver**

Quick Sale	Buses & Microbuses	Westlands	Nairobi	Kenyan Used	Unpainted	Nissan	White	Caravan (Urvan)	2000.0	
Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo	2014.0	127€
Nissan Caravan	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2009.0	
Mazda 110 2014 White	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mazda	Mazda	NaN	E2000	2014.0	57€
Toyota Hiace 2014 White	Buses & Microbuses	Mvita	Mombasa	Foreign Used	Toyota	Toyota	NaN	HiAce	2014.0	1215
Mazda Bongo Van, 2014, New Import	Buses & Microbuses	Nyali	Mombasa	Foreign Used	Mazda	Mazda	NaN	Bongo	2014.0	122C
Roller Coaster	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	Coaster	2012.0	88C
Mazda Bongo	Buses & Microbuses	Kikuyu	Kiambu	Kenyan Used	Mazda	Mazda	NaN	Bongo	2006.0	150C
Selling Matatu In Mombasa At A Very Affordable Prices	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	HiAce	2015.0	893
Toyota Hiace 2013	Buses & Microbuses	Ngara	Nairobi	Foreign Used	Toyota	Toyota	NaN	HiAce	2013.0	160C
Toyota Coaster 2014 White	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	Coaster	2014.0	189C
Toyota Coaster	Buses & Microbuses	Mombasa CBD	Mombasa	Kenyan Used	Toyota	Toyota	NaN	Coaster	2013.0	125C
Coaster Toyota Hiace 9l	Buses & Microbuses	Majengo	Mvita	Foreign Used	Toyota	Toyota	NaN	Coaster	2014.0	1085
Selling Buses In Mombasa Town	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mitsubishi	Mitsubishi	NaN	Fuso Rosa	2013.0	101€
Nissan Caravan	Buses & Microbuses	Embakasi	Nairobi	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	1997.0	360€
Toyota Hiace Auto Diesel	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	HiAce	2014.0	875
Toyota	Buses & Microbuses	Kilimani	Nairobi	Foreign	Toyota	Toyota	NaN	HiAce	2014.0	100C

Hiace 2014 White	Microbuses				Used							
Nissan Caravan Hummer Long Chassis	Buses & Microbuses	Mvita	Mombasa	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2012.0	989		
Toyota Hiace 2012 White	Buses & Microbuses	Mombasa CBD	Mombasa	Kenyan Used	Unpainted	Toyota	White	HiAce	2013.0	1230		
Toyota Hiace 2015 White	Buses & Microbuses	Ziwa la Ngombe	Nyali	Brand New	Toyota	Toyota	NaN	HiAce	2015.0	854		
Toyota Hiace 2011 Silver	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	HiAce	2011.0	1260		
Hiace 71 Box	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	No faults	Toyota	NaN	HiAce	2012.0	1150		

```
In [47]: Buses_df = df[mask].copy()
Buses_df.head()
```

```
Out[47]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	bod
Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.0	180000.0	
Nissan Van	Buses & Microbuses	Machakos Town	Machakos	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.0	267000.0	
Nissan NV200 2015 White	Buses & Microbuses	Changamwe	Mombasa	Foreign Used	Nissan	Nissan	NaN	NV200	2015.0	112000.0	
Toyota Hiace Box Petrol on Sale	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Toyota	Toyota	Grey	HiAce	2008.0	178769.0	
Chopper 9L Hiace	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	Grand HiAce	2015.0	101000.0	

```
In [50]: Buses_df.nlargest(5, 'price')
```

```
Out[50]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileag
--	----------	--------	---------------	-----------	-------	-------	-------	-------	-----	--------

Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo	2014.0	127800.
Selling Buses In Mombasa Town	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mitsubishi	Mitsubishi	NaN	Fuso Rosa	2013.0	101903.
Roller Coaster	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	Coaster	2012.0	88000.
Toyota Coaster 2014 White	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	Coaster	2014.0	189000.
Toyota Hiace 2015 White	Buses & Microbuses	Ziwa la Ngombe	Nyali	Brand New	Toyota	Toyota	NaN	HiAce	2015.0	85472.

```
In [51]: Microbuses_df = df[mask].copy()
Microbuses_df.head()
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	bod
	title										
	Clean NV300 Caravan 2014 Model Dielsel 16 Seater	Buses & Microbuses	Kilimani	Nairobi	Foreign Used	Nissan	Nissan	NaN	Caravan (Urvan)	2014.0	180000.0
	Nissan Van	Buses & Microbuses	Machakos Town	Machakos	Kenyan Used	Nissan	Nissan	NaN	Caravan (Urvan)	2013.0	267000.0
	Nissan NV200 2015 White	Buses & Microbuses	Changamwe	Mombasa	Foreign Used	Nissan	Nissan	NaN	NV200	2015.0	112000.0
	Toyota Hiace Box Petrol on Sale	Buses & Microbuses	Nairobi Central	Nairobi	Kenyan Used	Toyota	Toyota	Grey	HiAce	2008.0	178769.0
	Chopper 9L Hiace	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Toyota	Toyota	NaN	Grand HiAce	2015.0	101000.0

```
In [52]: Microbuses_df.nlargest(5, 'price')
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileag	
	title										
	Mazda Bongo	Buses & Microbuses	Ridgeways	Nairobi	Foreign Used	Unpainted, No faults	Mazda	White	Bongo	2014.0	127800.
	Selling Buses In	Buses & Microbuses	Tudor	Mombasa	Foreign Used	Mitsubishi	Mitsubishi	NaN	Fuso Rosa	2013.0	101903.

Mombasa Town											
Roller Coaster	Buses & Microbuses	Nairobi Central	Nairobi	Foreign Used	Toyota	Toyota	NaN	Coaster	2012.0	88000.	
Toyota Coaster 2014 White	Buses & Microbuses	Mombasa CBD	Mombasa	Foreign Used	Toyota	Toyota	NaN	Coaster	2014.0	189000.	
Toyota Hiace 2015 White	Buses & Microbuses	Ziwa la Ngombe	Nyali	Brand New	Toyota	Toyota	NaN	HiAce	2015.0	85472.	

```
In [53]: # titles and prices of 5 Trucks & Trailers with highest price
mask = df['category'] == 'Trucks & Trailers'
df[mask]
```

	category	region	parent_region	condition	attrs	brand	color	model	
	title								
	Very Clean Isuzu FRR Truck 2015 Model	Trucks & Trailers	Thome	Nairobi	Used	Used	Isuzu	White	F SERIES 21
	Truck Lorry	Trucks & Trailers	Shanzu	Mombasa	Used	Used	Ashok Leyland	NaN	1920 21
	Volvo NL12 for Sale	Trucks & Trailers	Embakasi	Nairobi	Used	Used	Volvo	NaN	NaN 19
	Mitsubishi Fuso Canter	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Mitsubishi	NaN	NaN 21
	Isuzu Elf,Year 2014manual Transmission	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	NaN	NaN 21
	Isuzu Nkr. Yr 2019	Trucks & Trailers	Ridgeways	Nairobi	Used	Used	Isuzu	White	N Series 21
	Toyota Townace Pickup	Trucks & Trailers	Kileleshwa	Nairobi	Used	Used	Toyota	White	HiAce 21
	Isuzu Frr Kbw	Trucks & Trailers	Eldoret CBD	Uasin Gishu	Used	Used	Isuzu	White	F SERIES 21
	Ashok Leyland//With Toyota Engine	Trucks & Trailers	Nakuru Town East	Nakuru	Used	Used	Ashok Leyland	NaN	NaN 21
	Mitsubishi Canter Tipper	Trucks & Trailers	Tudor	Mombasa	Used	Used	Mitsubishi	NaN	Canter 21
	Isuzu Elf,Year 2015 Manual	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	NaN	NaN 21
	Mitshubishi Canter Single 2005 Model Local	Trucks & Trailers	Parklands/Highridge	Nairobi	Used	Used	Mitsubishi	White	Canter 21
	Canter 4D32	Trucks & Trailers	Ruiru	Kiambu	Used	Used	Mitsubishi	White	Canter 19
	Isuzu NKR 2013 White	Trucks & Trailers	Kasarani	Nairobi	Used	Used	Isuzu	White	NaN 21

Shacman F2000 Tipper	Trucks & Trailers	Municipality	Meru	Used	Used	Shacman	NaN	NaN	20
Isuzu Truck	Trucks & Trailers	Donholm	Nairobi	NaN	Isuzu	Isuzu	NaN	N Series	
Mitsubishi Fuso Long Chassis	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Mitsubishi	NaN	Canter	20
Isuzu NPR 2006	Trucks & Trailers	Donholm	Nairobi	Used	Used	Isuzu	White	F SERIES	20
Isuzu NQR Canter	Trucks & Trailers	Kisauni	Mombasa	Used	Used	Isuzu	NaN	NaN	20
Mitsubishi Fuso 2014 Blue	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Mitsubishi	NaN	Canter	20
Toyota Dyna,Manual,Diesel	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Toyota	NaN	Dyna	20
Isuzu FVR Lorry	Trucks & Trailers	Nakuru Town West	Nakuru	Used	Used	Isuzu	NaN	F SERIES	19
Mitsubishi FH	Trucks & Trailers	Nairobi Central	Nairobi	Used	Used	Mitsubishi	NaN	Canter	20
Mitsubishi Fh215 KCC	Trucks & Trailers	Ruiru	Kiambu	Used	Used	Mitsubishi	White	FA/FI	20
5-6 Tonnes Freezer Body Elf Isuzu	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	White	N Series	20
Isuzu Elf Truck	Trucks & Trailers	Nairobi Central	Nairobi	Used	Used	Isuzu	NaN	NaN	20
Tipper In Excellent Condition.	Trucks & Trailers	Mombasa CBD	Mombasa	NaN	Isuzu	Isuzu	NaN	NaN	20
Isuzu Elf Truck	Trucks & Trailers	Ganjoni	Mombasa	Used	Used	Isuzu	NaN	NaN	20
Isuzu Forward 7 Tonne Freezer	Trucks & Trailers	Tudor	Mombasa	Used	Used	Isuzu	NaN	F SERIES	20
Isuzu Truck	Trucks & Trailers	Makadara	Nairobi	Used	Used	Isuzu	NaN	N Series	19
Hino Dutro Long Chassis Front Leaf Springs	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Other	NaN	Other	20
Mercedes-Benz Actros	Trucks & Trailers	Thome	Nairobi	Used	Used	Mercedes-Benz	NaN	NaN	20
Mazda Bongo 2013	Trucks & Trailers	Ngong	Kajiado	NaN	Mazda	Mazda	NaN	NaN	20
Isuzu Direct Injection HTR 7 Tons	Trucks & Trailers	Parklands/Highridge	Nairobi	Used	Used	Isuzu	NaN	NaN	19
Dyna DIESEL Manual	Trucks & Trailers	Tudor	Mombasa	Brand New	Brand New	Toyota	Red	Dyna	20
Tata Signa LPK-1618 Tipper 10 Ton	Trucks & Trailers	Nairobi Central	Nairobi	Brand New	Brand New	Tata	NaN	M&HCV Rigid Truck	20
Isuzu NPR Clean	Trucks &	Nairobi Central	Nairobi	Used	Used	Isuzu	Other	N Series	20

Unit	Trailer	Region	Parent Region	Condition	Attrs	Brand	Color	Model	YOM	Mileage	Brand
Mitsubishi Fh 2007	Trucks & Trailers	Donholm	Nairobi	Used	Used	Mitsubishi	White	FA/FI	2014.0	NaN	2014.0
Isuzu Lorry LPR	Trucks & Trailers	Kilimani	Nairobi	Used	Used	Isuzu	Blue	F SERIES	2014.0	NaN	2014.0
Canter Fuso Back and Front Leaf Springs	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Mitsubishi	White	Canter	2014.0	NaN	2014.0
Single Diff Volvo FL10	Trucks & Trailers	Embakasi	Nairobi	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Suzuki Super Carry 2014 White	Trucks & Trailers	Lavington	Nairobi	Used	Used	Suzuki	NaN	Carry	2014.0	NaN	2014.0
Daihatsu HIJET 2014 Silver	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Daihatsu	Silver	Hijet	2014.0	NaN	2014.0
TATA 407 Lorry	Trucks & Trailers	Nakuru Town West	Nakuru	Used	Used	Tata	NaN	407	2014.0	NaN	2014.0
Mitsubishi Fuso	Trucks & Trailers	Runda	Nairobi	Brand New	Brand New	Mitsubishi	NaN	NaN	2014.0	NaN	2014.0
Toyota Dyna, 2014, Manual, Very Low Mileage 151k (Genuine)	Trucks & Trailers	Mombasa Road	Nairobi	Brand New	Brand New	Toyota	White	Dyna	2014.0	NaN	2014.0
Mitsubishi Hd	Trucks & Trailers	Kisauni	Mombasa	Used	Used	Mitsubishi	NaN	NaN	2014.0	NaN	2014.0
Mitsubishi Fuso Refrigerated	Trucks & Trailers	Kisauni	Mombasa	Used	Used	Mitsubishi	NaN	Canter	2014.0	NaN	2014.0

```
In [55]: trucks_df = df[mask].copy()
trucks_df.head()
```

```
Out[55]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	brand
Very Clean Isuzu FRR Truck 2015 Model	Trucks & Trailers	Thome	Nairobi	Used	Used	Isuzu	White	F SERIES	2015.0	NaN	2015.0
Truck Lorry	Trucks & Trailers	Shanzu	Mombasa	Used	Used	Ashok Leyland	NaN	1920	2014.0	NaN	2014.0
Volvo NL12 for Sale	Trucks & Trailers	Embakasi	Nairobi	Used	Used	Volvo	NaN	NaN	1994.0	NaN	1994.0
Mitsubishi Fuso Canter	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Mitsubishi	NaN	NaN	2014.0	NaN	2014.0
Isuzu Elf, Year 2014 manual Transmission	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	NaN	NaN	2013.0	NaN	2013.0

```
In [56]: trucks_df.nlargest(5, 'price')
```

```
Out[56]:
```

	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	brand
--	----------	--------	---------------	-----------	-------	-------	-------	-------	-----	---------	-------

title	category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	bc
Mercedes-Benz Actros	Trucks & Trailers	Thome	Nairobi	Used	Used	Mercedes-Benz	NaN	NaN	2013.0	NaN	NaN
Tata Signa LPK-1618 Tipper 10 Ton	Trucks & Trailers	Nairobi Central	Nairobi	Brand New	Brand New	Tata	NaN	M&HCV Rigid Truck	2021.0	NaN	NaN
Shacman F2000 Tipper	Trucks & Trailers	Municipality	Meru	Used	Used	Shacman	NaN	NaN	2018.0	NaN	NaN
Isuzu Forward 7 Tonne Freezer	Trucks & Trailers	Tudor	Mombasa	Used	Used	Isuzu	NaN	F SERIES	2015.0	NaN	NaN
Isuzu Elf,Year 2015 Manual	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	NaN	NaN	2014.0	NaN	NaN

```
In [57]: Trailers_df = df[mask].copy()
Trailers_df.head()
```

```
Out[57]:
```

category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	bc	
Very Clean Isuzu FRR Truck 2015 Model	Trucks & Trailers	Thome	Nairobi	Used	Used	Isuzu	White	F SERIES	2015.0	NaN	NaN
Truck Lorry	Trucks & Trailers	Shanzu	Mombasa	Used	Used	Ashok Leyland	NaN	1920	2014.0	NaN	NaN
Volvo NL12 for Sale	Trucks & Trailers	Embakasi	Nairobi	Used	Used	Volvo	NaN	NaN	1994.0	NaN	NaN
Mitsubishi Fuso Canter	Trucks & Trailers	Mombasa CBD	Mombasa	Used	Used	Mitsubishi	NaN	NaN	2014.0	NaN	NaN
Isuzu Elf,Year 2014manual Transmission	Trucks & Trailers	Mombasa CBD	Mombasa	Brand New	Brand New	Isuzu	NaN	NaN	2013.0	NaN	NaN

```
In [58]: Trailers_df.nlargest(5, 'price')
```

```
Out[58]:
```

category	region	parent_region	condition	attrs	brand	color	model	yom	mileage	b	
Mercedes-Benz Actros	Trucks & Trailers	Thome	Nairobi	Used	Used	Mercedes-Benz	NaN	NaN	2013.0	NaN	NaN
Tata Signa LPK-1618 Tipper 10 Ton	Trucks & Trailers	Nairobi Central	Nairobi	Brand New	Brand New	Tata	NaN	M&HCV Rigid Truck	2021.0	NaN	NaN
Shacman	Trucks & Trailers	Municipality	Meru	Used	Used	Shacman	NaN	NaN	2018.0	NaN	NaN

F2000
Tipper

Trailers

Isuzu
Forward 7
Tonne
Freezer

Trucks &
Trailers

Tudor

Mombasa

Used

Used

Isuzu

NaN

F
SERIES

2015.0

NaN

Isuzu
Elf, Year
2015
Manual

Trucks &
Trailers

Mombasa
CBD

Mombasa

Brand
New

Brand
New

Isuzu

NaN

NaN

2014.0

NaN

plotting

```
In [62]: df['brand'].value_counts()
```

```
Out[62]: 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 [63]: df['brand'].value_counts()[:10]
```

```
Out[63]: 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 [64]: top_5 = df['brand'].value_counts()[:10]
```

```
In [66]: plt.figure(figsize=(14,10))  
plt.title("Top 10 Brands", fontsize=14, fontweight='bold')  
top_5.plot.bar()  
plt.xlabel('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()
```

