Hands-on Activity 10.1 Data Analysis using Python

CPE311 - Computational Thinking with Python

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Section: CPE22S3

Performed on: 07/09/2024

Submitted on: 07/12/2024

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Intended Learning Outcome

1. Perform descriptive and correlation analysis to to analyze the dataset.
2. Interpret the results of descriptive and correlation analysis

Resources

- Personal Computer
- Jupyter Notebook
- Internet Connection

Instruction

1. **Gather a dataset regarding your identified problem for the ASEAN Data Science Explorer.** Make sure that the dataset includes multiple variables.
2. Load the dataset into pandas dataframe.
3. Prepare the data by applying appropriate data preprocessing techniques.
4. Analyze the data using descriptive analysis.
4. Perform correlation analysis.
5. Interpret the results based on the descriptive and correlation analysis.
6. Submit the PDF file.

Amazon Stockprices from 1973-2023: https://www.kaggle.com/datasets/beeru999/amazon-stock-prices1997-2021?resource=download

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

amznStocks= pd.read_csv('/content/amzn.csv')
amznStocks

# we are going to be using the amazon stocks prices from 1973-2023 csv from kaggle
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	1997-05-15	0.121875	0.125000	0.096354	0.097917	0.097917	1443120000
1	1997-05-16	0.098438	0.098958	0.085417	0.086458	0.086458	294000000
2	1997-05-19	0.088021	0.088542	0.081250	0.085417	0.085417	122136000
3	1997-05-20	0.086458	0.087500	0.081771	0.081771	0.081771	109344000
4	1997-05-21	0.081771	0.082292	0.068750	0.071354	0.071354	377064000
...	...	...	...	...	...	...	...
6511	2023-03-30	101.550003	103.040001	101.010002	102.000000	102.000000	53633400
6512	2023-03-31	102.160004	103.489998	101.949997	103.290001	103.290001	56704300
6513	2023-04-03	102.300003	103.290001	101.430000	102.410004	102.410004	41135700
6514	2023-04-04	102.750000	104.199997	102.110001	103.949997	103.949997	48662500
6515	2023-04-05	103.910004	103.910004	100.750000	101.099998	101.099998	45103000

6516 rows × 7 columns

```
amznStocks.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6516 entries, 0 to 6515
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype
---  ------     --------------  -----
 0   Date       6516 non-null   object
 1   Open       6516 non-null   float64
 2   High       6516 non-null   float64
 3   Low        6516 non-null   float64
 4   Close      6516 non-null   float64
 5   Adj Close  6516 non-null   float64
 6   Volume     6516 non-null   int64
dtypes: float64(5), int64(1), object(1)
memory usage: 356.5+ KB
```

```
amznStocks.sort_values(by= 'High', ascending= False).head(20)
```

	Date	Open	High	Low	Close	Adj Close	Volume
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6172	2021-11-22	183.819000	185.673004	178.375000	178.628494	178.628494	96844000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6170	2021-11-18	178.317505	185.210007	178.050003	184.802994	184.802994	114070000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6074	2021-07-06	176.505493	184.274002	176.449997	183.787003	183.787003	134896000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6082	2021-07-16	181.665497	182.302994	178.522995	178.681503	178.681503	80874000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6175	2021-11-26	180.104996	181.675003	175.207504	175.227997	175.227997	59826000
6173	2021-11-23	179.251999	181.052505	176.385498	179.001999	179.001999	73804000

```
# sorting volume by the higher 20s

amznStocks['Volume'] = pd.to_numeric(amznStocks['Volume'], errors='coerce')
amznStocks.nlargest(20, 'Volume')
```

	Date	Open	High	Low	Close	Adj Close	Volume
2500	2007-04-25	2.656000	2.859000	2.647500	2.840500	2.840500	2086584000
401	1998-12-16	2.159375	2.514583	2.158333	2.408333	2.408333	2035944000
386	1998-11-24	1.866667	1.942708	1.708333	1.787500	1.787500	1633512000
598	1999-09-29	3.325000	4.250000	3.287500	4.037500	4.037500	1587488000
2313	2006-07-26	1.438000	1.450000	1.298000	1.313000	1.313000	1539704000
0	1997-05-15	0.121875	0.125000	0.096354	0.097917	0.097917	1443120000
239	1998-04-28	0.386979	0.414583	0.371094	0.398438	0.398438	1391880000
385	1998-11-23	1.590625	1.820833	1.550521	1.816667	1.816667	1355628000
402	1998-12-17	2.200000	2.429167	2.171354	2.306250	2.306250	1352700000
327	1998-09-01	0.634375	0.721875	0.541667	0.666276	0.666276	1349016000
384	1998-11-20	1.458333	1.514583	1.375000	1.505208	1.505208	1338252000
416	1999-01-08	4.606250	4.978125	3.800000	4.006250	4.006250	1333244000
413	1999-01-05	2.739063	3.243750	2.662500	3.112500	3.112500	1257464000
2501	2007-04-26	2.825000	3.152000	2.803500	3.139000	3.139000	1243590000
381	1998-11-17	1.078125	1.285417	1.070833	1.237500	1.237500	1222836000
1942	2005-02-03	1.745000	1.794500	1.726500	1.787500	1.787500	1210372000
2563	2007-07-25	4.233000	4.440000	4.182500	4.309000	4.309000	1209048000
2143	2005-11-18	2.345000	2.400000	2.333000	2.399000	2.399000	1186656000
382	1998-11-18	1.263542	1.421875	1.262500	1.366667	1.366667	1182672000
279	1998-06-24	0.791667	0.839583	0.742708	0.831771	0.831771	1174092000

```
# sorting the same column by the lower 20s

amznStocks['High'] = pd.to_numeric(amznStocks['High'], errors='coerce')
amznStocks.nsmallest(20, 'High')
```

	Date	Open	High	Low	Close	Adj Close	Volume
5	1997-05-22	0.071875	0.072396	0.065625	0.069792	0.069792	235536000
13	1997-06-04	0.073958	0.074479	0.069792	0.070833	0.070833	61608000
10	1997-05-30	0.075000	0.075521	0.073958	0.075000	0.075000	51888000
30	1997-06-27	0.075781	0.075781	0.073958	0.074479	0.074479	23760000
6	1997-05-23	0.070313	0.076042	0.066667	0.075000	0.075000	318744000
29	1997-06-26	0.076042	0.076042	0.075260	0.075521	0.075521	63792000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
28	1997-06-25	0.076302	0.076302	0.074479	0.075521	0.075521	42120000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
12	1997-06-03	0.076563	0.076563	0.073958	0.073958	0.073958	23664000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
23	1997-06-18	0.076042	0.076823	0.075000	0.075521	0.075521	49296000
9	1997-05-29	0.077083	0.077083	0.073958	0.075260	0.075260	69456000
14	1997-06-05	0.070833	0.077083	0.068750	0.077083	0.077083	113448000
26	1997-06-23	0.077083	0.077083	0.073958	0.075000	0.075000	20952000
32	1997-07-01	0.077083	0.077083	0.075521	0.075781	0.075781	25848000
25	1997-06-20	0.076563	0.077604	0.075000	0.076302	0.076302	67752000
33	1997-07-02	0.075781	0.079688	0.075521	0.079427	0.079427	77640000
22	1997-06-17	0.079948	0.079948	0.074740	0.075260	0.075260	94128000
31	1997-06-30	0.075521	0.079948	0.073958	0.077083	0.077083	54936000

```
# now doing the large 20s for volume
amznStocks.nsmallest(20, 'Volume')
```

	Date	Open	High	Low	Close	Adj Close	Volume
156	1997-12-26	0.228125	0.232292	0.224479	0.226042	0.226042	9744000
61	1997-08-12	0.114063	0.115104	0.109896	0.109896	0.109896	11424000
45	1997-07-21	0.108854	0.109896	0.107292	0.109115	0.109115	11496000
62	1997-08-13	0.111458	0.111458	0.108333	0.109896	0.109896	11808000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
49	1997-07-25	0.110938	0.112500	0.110938	0.111458	0.111458	12408000
68	1997-08-21	0.106771	0.108594	0.103646	0.105729	0.105729	12480000
20	1997-06-13	0.081250	0.081250	0.079167	0.079167	0.079167	13872000
69	1997-08-22	0.105208	0.106250	0.104688	0.106250	0.106250	14256000
74	1997-08-29	0.118229	0.118750	0.116146	0.116927	0.116927	14448000
75	1997-09-02	0.117188	0.118750	0.116667	0.117708	0.117708	14640000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
44	1997-07-18	0.109375	0.110938	0.107813	0.107813	0.107813	15600000
104	1997-10-13	0.196354	0.202083	0.196354	0.200000	0.200000	16296000
5690	2019-12-24	89.690498	89.778503	89.378998	89.460503	89.460503	17626000
21	1997-06-16	0.080208	0.080208	0.078125	0.078646	0.078646	18264000
3928	2012-12-24	12.865000	12.975000	12.848000	12.931000	12.931000	19688000
67	1997-08-20	0.109375	0.109375	0.103646	0.108333	0.108333	19992000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
66	1997-08-19	0.104688	0.110417	0.102604	0.108333	0.108333	20064000

```
# sort for the large 20s for High column
amznStocks.nlargest(20, 'High')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6172	2021-11-22	183.819000	185.673004	178.375000	178.628494	178.628494	96844000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6170	2021-11-18	178.317505	185.210007	178.050003	184.802994	184.802994	114070000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6074	2021-07-06	176.505493	184.274002	176.449997	183.787003	183.787003	134896000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6082	2021-07-16	181.665497	182.302994	178.522995	178.681503	178.681503	80874000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6175	2021-11-26	180.104996	181.675003	175.207504	175.227997	175.227997	59826000
6173	2021-11-23	179.251999	181.052505	176.385498	179.001999	179.001999	73804000

```
# sorting the Open by the lower 20s

amznStocks['Open'] = pd.to_numeric(amznStocks['Open'], errors='coerce')
amznStocks.nsmallest(20, 'Open')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6	1997-05-23	0.070313	0.076042	0.066667	0.075000	0.075000	318744000
14	1997-06-05	0.070833	0.077083	0.068750	0.077083	0.077083	113448000
5	1997-05-22	0.071875	0.072396	0.065625	0.069792	0.069792	235536000
13	1997-06-04	0.073958	0.074479	0.069792	0.070833	0.070833	61608000
10	1997-05-30	0.075000	0.075521	0.073958	0.075000	0.075000	51888000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
7	1997-05-27	0.075521	0.082292	0.072917	0.079167	0.079167	173952000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
31	1997-06-30	0.075521	0.079948	0.073958	0.077083	0.077083	54936000
15	1997-06-06	0.075781	0.085417	0.075521	0.082813	0.082813	156144000
30	1997-06-27	0.075781	0.075781	0.073958	0.074479	0.074479	23760000
33	1997-07-02	0.075781	0.079688	0.075521	0.079427	0.079427	77640000
23	1997-06-18	0.076042	0.076823	0.075000	0.075521	0.075521	49296000
29	1997-06-26	0.076042	0.076042	0.075260	0.075521	0.075521	63792000
28	1997-06-25	0.076302	0.076302	0.074479	0.075521	0.075521	42120000
12	1997-06-03	0.076563	0.076563	0.073958	0.073958	0.073958	23664000
25	1997-06-20	0.076563	0.077604	0.075000	0.076302	0.076302	67752000
9	1997-05-29	0.077083	0.077083	0.073958	0.075260	0.075260	69456000
26	1997-06-23	0.077083	0.077083	0.073958	0.075000	0.075000	20952000

```
# now by the larger 20s
amznStocks.nlargest(20, 'Open')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6172	2021-11-22	183.819000	185.673004	178.375000	178.628494	178.628494	96844000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6082	2021-07-16	181.665497	182.302994	178.522995	178.681503	178.681503	80874000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6175	2021-11-26	180.104996	181.675003	175.207504	175.227997	175.227997	59826000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6173	2021-11-23	179.251999	181.052505	176.385498	179.001999	179.001999	73804000
6085	2021-07-21	178.819000	179.322495	177.182007	179.259995	179.259995	46380000
6084	2021-07-20	178.365997	179.600006	175.899994	178.659500	178.659500	65114000

```
# sorting the Low by the lower 20s

amznStocks['Low'] = pd.to_numeric(amznStocks['Low'], errors='coerce')
amznStocks.nsmallest(20, 'Low')
```

	Date	Open	High	Low	Close	Adj Close	Volume
5	1997-05-22	0.071875	0.072396	0.065625	0.069792	0.069792	235536000
6	1997-05-23	0.070313	0.076042	0.066667	0.075000	0.075000	318744000
4	1997-05-21	0.081771	0.082292	0.068750	0.071354	0.071354	377064000
14	1997-06-05	0.070833	0.077083	0.068750	0.077083	0.077083	113448000
13	1997-06-04	0.073958	0.074479	0.069792	0.070833	0.070833	61608000
7	1997-05-27	0.075521	0.082292	0.072917	0.079167	0.079167	173952000
9	1997-05-29	0.077083	0.077083	0.073958	0.075260	0.075260	69456000
10	1997-05-30	0.075000	0.075521	0.073958	0.075000	0.075000	51888000
12	1997-06-03	0.076563	0.076563	0.073958	0.073958	0.073958	23664000
26	1997-06-23	0.077083	0.077083	0.073958	0.075000	0.075000	20952000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
30	1997-06-27	0.075781	0.075781	0.073958	0.074479	0.074479	23760000
31	1997-06-30	0.075521	0.079948	0.073958	0.077083	0.077083	54936000
28	1997-06-25	0.076302	0.076302	0.074479	0.075521	0.075521	42120000
22	1997-06-17	0.079948	0.079948	0.074740	0.075260	0.075260	94128000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
23	1997-06-18	0.076042	0.076823	0.075000	0.075521	0.075521	49296000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
25	1997-06-20	0.076563	0.077604	0.075000	0.076302	0.076302	67752000
29	1997-06-26	0.076042	0.076042	0.075260	0.075521	0.075521	63792000

```
# sorting the Open by the lower 20s
amznStocks.nlargest(20, 'Low')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6082	2021-07-16	181.665497	182.302994	178.522995	178.681503	178.681503	80874000
6172	2021-11-22	183.819000	185.673004	178.375000	178.628494	178.628494	96844000
6170	2021-11-18	178.317505	185.210007	178.050003	184.802994	184.802994	114070000
6169	2021-11-17	178.235992	179.362503	177.267502	177.449997	177.449997	51206000
6085	2021-07-21	178.819000	179.322495	177.182007	179.259995	179.259995	46380000
6174	2021-11-24	178.133499	180.682007	176.842499	179.020493	179.020493	46560000

```
# sorting the Close by the lower 20s

amznStocks['Close'] = pd.to_numeric(amznStocks['Close'], errors='coerce')
amznStocks.nsmallest(20, 'Close')
```

	Date	Open	High	Low	Close	Adj Close	Volume
5	1997-05-22	0.071875	0.072396	0.065625	0.069792	0.069792	235536000
13	1997-06-04	0.073958	0.074479	0.069792	0.070833	0.070833	61608000
4	1997-05-21	0.081771	0.082292	0.068750	0.071354	0.071354	377064000
12	1997-06-03	0.076563	0.076563	0.073958	0.073958	0.073958	23664000
30	1997-06-27	0.075781	0.075781	0.073958	0.074479	0.074479	23760000
6	1997-05-23	0.070313	0.076042	0.066667	0.075000	0.075000	318744000
10	1997-05-30	0.075000	0.075521	0.073958	0.075000	0.075000	51888000
26	1997-06-23	0.077083	0.077083	0.073958	0.075000	0.075000	20952000
9	1997-05-29	0.077083	0.077083	0.073958	0.075260	0.075260	69456000
22	1997-06-17	0.079948	0.079948	0.074740	0.075260	0.075260	94128000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
23	1997-06-18	0.076042	0.076823	0.075000	0.075521	0.075521	49296000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
28	1997-06-25	0.076302	0.076302	0.074479	0.075521	0.075521	42120000
29	1997-06-26	0.076042	0.076042	0.075260	0.075521	0.075521	63792000
32	1997-07-01	0.077083	0.077083	0.075521	0.075781	0.075781	25848000
25	1997-06-20	0.076563	0.077604	0.075000	0.076302	0.076302	67752000
8	1997-05-28	0.081250	0.081771	0.076563	0.076563	0.076563	91488000
14	1997-06-05	0.070833	0.077083	0.068750	0.077083	0.077083	113448000

```
amznStocks.nlargest(20, 'Close')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6170	2021-11-18	178.317505	185.210007	178.050003	184.802994	184.802994	114070000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6074	2021-07-06	176.505493	184.274002	176.449997	183.787003	183.787003	134896000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6085	2021-07-21	178.819000	179.322495	177.182007	179.259995	179.259995	46380000
6174	2021-11-24	178.133499	180.682007	176.842499	179.020493	179.020493	46560000
6173	2021-11-23	179.251999	181.052505	176.385498	179.001999	179.001999	73804000
6163	2021-11-09	175.762497	179.688507	175.071503	178.811493	178.811493	85898000

```
# sorting the Adjusted Close by the lower 20s

amznStocks['Adj Close'] = pd.to_numeric(amznStocks['Adj Close'], errors='coerce')
amznStocks.nsmallest(20, 'Adj Close')
```

	Date	Open	High	Low	Close	Adj Close	Volume
5	1997-05-22	0.071875	0.072396	0.065625	0.069792	0.069792	235536000
13	1997-06-04	0.073958	0.074479	0.069792	0.070833	0.070833	61608000
4	1997-05-21	0.081771	0.082292	0.068750	0.071354	0.071354	377064000
12	1997-06-03	0.076563	0.076563	0.073958	0.073958	0.073958	23664000
30	1997-06-27	0.075781	0.075781	0.073958	0.074479	0.074479	23760000
6	1997-05-23	0.070313	0.076042	0.066667	0.075000	0.075000	318744000
10	1997-05-30	0.075000	0.075521	0.073958	0.075000	0.075000	51888000
26	1997-06-23	0.077083	0.077083	0.073958	0.075000	0.075000	20952000
9	1997-05-29	0.077083	0.077083	0.073958	0.075260	0.075260	69456000
22	1997-06-17	0.079948	0.079948	0.074740	0.075260	0.075260	94128000
11	1997-06-02	0.075521	0.076563	0.075000	0.075521	0.075521	11832000
23	1997-06-18	0.076042	0.076823	0.075000	0.075521	0.075521	49296000
24	1997-06-19	0.075521	0.076563	0.075000	0.075521	0.075521	20064000
27	1997-06-24	0.075260	0.076302	0.073958	0.075521	0.075521	15024000
28	1997-06-25	0.076302	0.076302	0.074479	0.075521	0.075521	42120000
29	1997-06-26	0.076042	0.076042	0.075260	0.075521	0.075521	63792000
32	1997-07-01	0.077083	0.077083	0.075521	0.075781	0.075781	25848000
25	1997-06-20	0.076563	0.077604	0.075000	0.076302	0.076302	67752000
8	1997-05-28	0.081250	0.081771	0.076563	0.076563	0.076563	91488000
14	1997-06-05	0.070833	0.077083	0.068750	0.077083	0.077083	113448000

```
amznStocks.nlargest(20, 'Adj Close')
```

	Date	Open	High	Low	Close	Adj Close	Volume
6076	2021-07-08	182.177994	187.999496	181.056000	186.570496	186.570496	103612000
6077	2021-07-09	186.126007	187.399994	184.669998	185.966995	185.966995	74964000
6078	2021-07-12	187.199997	187.864502	184.839493	185.927505	185.927505	51432000
6088	2021-07-26	183.658493	185.604004	182.362503	184.990997	184.990997	58002000
6075	2021-07-07	185.869003	186.710007	183.945496	184.828995	184.828995	106562000
6170	2021-11-18	178.317505	185.210007	178.050003	184.802994	184.802994	114070000
6080	2021-07-14	185.442505	185.882996	183.041504	184.084000	184.084000	65932000
6079	2021-07-13	185.104996	188.654007	183.565994	183.867996	183.867996	76918000
6171	2021-11-19	185.634506	188.107498	183.785995	183.828506	183.828506	98734000
6074	2021-07-06	176.505493	184.274002	176.449997	183.787003	183.787003	134896000
6087	2021-07-23	182.000000	183.305496	181.102005	182.832001	182.832001	48726000
6086	2021-07-22	179.361496	182.001007	179.113495	181.901505	181.901505	65308000
6081	2021-07-15	184.710007	184.770004	181.046005	181.559998	181.559998	63706000
6090	2021-07-28	181.688995	182.921005	180.050003	181.516006	181.516006	59988000
6089	2021-07-27	184.925003	184.925003	179.307495	181.319504	181.319504	82638000
6091	2021-07-29	181.387497	181.897507	179.000504	179.996002	179.996002	110400000
6085	2021-07-21	178.819000	179.322495	177.182007	179.259995	179.259995	46380000
6174	2021-11-24	178.133499	180.682007	176.842499	179.020493	179.020493	46560000
6173	2021-11-23	179.251999	181.052505	176.385498	179.001999	179.001999	73804000
6163	2021-11-09	175.762497	179.688507	175.071503	178.811493	178.811493	85898000

```
# Measures of Central Tendency for Open
print('Mean of Open:', amznStocks['Open'].mean())
print('Median of Open:', amznStocks['Open'].median())
print('Mode of Open:', amznStocks['Open'].mode())
print('\n')

# Measures of Central Tendency for Close
print('Mean of Close:', amznStocks['Close'].mean())
print('Median of Close:', amznStocks['Close'].median())
print('Mode of Close:', amznStocks['Close'].mode())
print('\n')

# Measures of Central Tendency for High
print('Mean of High:', amznStocks['High'].mean())
print('Median of High:', amznStocks['High'].median())
print('Mode of High:', amznStocks['High'].mode())
print('\n')

# Measures of Central Tendency for Low
print('Mean of Low:', amznStocks['Low'].mean())
print('Median of Low:', amznStocks['Low'].median())
print('Mode of Low:', amznStocks['Low'].mode())
print('\n')

# Measures of Central Tendency for Volume
print('Mean of Volume:', amznStocks['Volume'].mean())
print('Median of Volume:', amznStocks['Volume'].median())
print('Mode of Volume:', amznStocks['Volume'].mode())
print('\n')

# Measures of Central Tendency for Adj Close
print('Mean of Adj Close:', amznStocks['Adj Close'].mean())
print('Median of Adj Close:', amznStocks['Adj Close'].median())
print('Mode of Adj Close:', amznStocks['Adj Close'].mode())
```

```
Mean of Open: 31.611626371853895
Median of Open: 6.4567499999999995
Mode of Open: 0    1.675
Name: Open, dtype: float64


Mean of Close: 31.59973960620012
Median of Close: 6.44425
Mode of Close: 0    0.075521
Name: Close, dtype: float64


Mean of High: 31.99199514548803
Median of High: 6.5355
Mode of High: 0    0.85
1    1.85
Name: High, dtype: float64


Mean of Low: 31.19343219429098
Median of Low: 6.35325
Mode of Low: 0    0.073958
1    0.750000
2    3.800000
Name: Low, dtype: float64


Mean of Volume: 142533820.3038674
Median of Volume: 105905000.0
Mode of Volume: 0    58272000
Name: Volume, dtype: int64


Mean of Adj Close: 31.59973960620012
Median of Adj Close: 6.44425
Mode of Adj Close: 0    0.075521
Name: Adj Close, dtype: float64
```

```
# Measures of Dispersion for Open
print('Range of Open:', amznStocks['Open'].max() - amznStocks['Open'].min())
print('Variance of Open:', amznStocks['Open'].var())
print('Standard Deviation of Open:', amznStocks['Open'].std())
print('\n')

# Measures of Dispersion for Close
print('Range of Close:', amznStocks['Close'].max() - amznStocks['Close'].min())
print('Variance of Close:', amznStocks['Close'].var())
print('Standard Deviation of Close:', amznStocks['Close'].std())
print('\n')

# Measures of Dispersion for High
print('Range of High:', amznStocks['High'].max() - amznStocks['High'].min())
print('Variance of High:', amznStocks['High'].var())
print('Standard Deviation of High:', amznStocks['High'].std())
print('\n')

# Measures of Dispersion for Low
print('Range of Low:', amznStocks['Low'].max() - amznStocks['Low'].min())
print('Variance of Low:', amznStocks['Low'].var())
print('Standard Deviation of Low:', amznStocks['Low'].std())
print('\n')

# Measures of Dispersion for Volume
print('Range of Volume:', amznStocks['Volume'].max() - amznStocks['Volume'].min())
print('Variance of Volume:', amznStocks['Volume'].var())
print('Standard Deviation of Volume:', amznStocks['Volume'].std())
print('\n')

# Measures of Dispersion for Adj Close
print('Range of Adj Close:', amznStocks['Adj Close'].max() - amznStocks['Adj Close'].min())
print('Variance of Adj Close:', amznStocks['Adj Close'].var())
print('Standard Deviation of Adj Close:', amznStocks['Adj Close'].std())
```

```
Range of Open: 187.129684
Variance of Open: 2313.1619811301593
Standard Deviation of Open: 48.09534261371011


Range of Close: 186.50070399999998
Variance of Close: 2309.78842706972
```

```
import matplotlib.pyplot as plt
import seaborn as sns
plt.figure(figsize=(16, 8))
sns.lineplot(x='Date', y='Open', data=amznStocks, label='Open')
sns.lineplot(x='Date', y='Close', data=amznStocks, label='Close')
sns.lineplot(x='Date', y='High', data=amznStocks, label='High')
sns.lineplot(x='Date', y='Low', data=amznStocks, label='Low')
# sns.lineplot(x='Date', y='Volume', data=amznStocks, label='Volume')
sns.lineplot(x='Date', y='Adj Close', data=amznStocks, label='Adj Close')
plt.xticks(rotation=45)
plt.title('Amazon Stock Prices Over Time')
plt.xlabel('Date')
```