25-07-2023

```
In [2]: import numpy as np
        import pandas as pd
```

```
In [76]: a=pd.read_csv(r"C:\Users\user\Downloads\2_2015.csv")
         a
```

...	...	...	...	...	...	...	...	...	...	...	...	...
153	Rwanda	Sub-Saharan Africa	154	3.465	0.03464	0.22208	0.77370	0.42864	0.59201	0.55191	0.22628	0.6
154	Benin	Sub-Saharan Africa	155	3.340	0.03656	0.28665	0.35386	0.31910	0.48450	0.08010	0.18260	1.6
155	Syria	Middle East and Northern Africa	156	3.006	0.05015	0.66320	0.47489	0.72193	0.15684	0.18906	0.47179	0.3
156	Burundi	Sub-Saharan Africa	157	2.905	0.08658	0.01530	0.41587	0.22396	0.11850	0.10062	0.19727	1.8
157	Togo	Sub-Saharan Africa	158	2.839	0.06727	0.20868	0.13995	0.28443	0.36453	0.10731	0.16681	1.5

```
In [77]:  a=a.head(50)
          a
```

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dy Re
0	Switzerland	Western Europe	1	7.587	0.03411	1.39651	1.34951	0.94143	0.66557	0.41978	0.29678	2
1	Iceland	Western Europe	2	7.561	0.04884	1.30232	1.40223	0.94784	0.62877	0.14145	0.43630	2
2	Denmark	Western Europe	3	7.527	0.03328	1.32548	1.36058	0.87464	0.64938	0.48357	0.34139	2
3	Norway	Western Europe	4	7.522	0.03880	1.45900	1.33095	0.88521	0.66973	0.36503	0.34699	2
4	Canada	North America	5	7.427	0.03553	1.32629	1.32261	0.90563	0.63297	0.32957	0.45811	2
5	Finland	Western Europe	6	7.406	0.03140	1.29025	1.31826	0.88911	0.64169	0.41372	0.23351	2
6	Netherlands	Western Europe	7	7.378	0.02799	1.32944	1.28017	0.89284	0.61576	0.31814	0.47610	2
7	Sweden	Western Europe	8	7.364	0.03157	1.33171	1.28907	0.91087	0.65980	0.43844	0.36262	2
8	New Zealand	Australia and New Zealand	9	7.286	0.03371	1.25018	1.31967	0.90837	0.63938	0.42922	0.47501	2
9	Australia	Australia and New Zealand	10	7.284	0.04083	1.33358	1.30923	0.93156	0.65124	0.35637	0.43562	2
10	Israel	Middle East and Northern Africa	11	7.278	0.03470	1.22857	1.22393	0.91387	0.41319	0.07785	0.33172	3
11	Costa Rica	Latin America and Caribbean	12	7.226	0.04454	0.95578	1.23788	0.86027	0.63376	0.10583	0.25497	3
12	Austria	Western Europe	13	7.200	0.03751	1.33723	1.29704	0.89042	0.62433	0.18676	0.33088	2
13	Mexico	Latin America and Caribbean	14	7.187	0.04176	1.02054	0.91451	0.81444	0.48181	0.21312	0.14074	3
14	United States	North America	15	7.119	0.03839	1.39451	1.24711	0.86179	0.54604	0.15890	0.40105	2

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dy Re
15	Brazil	Latin America and Caribbean	16	6.983	0.04076	0.98124	1.23287	0.69702	0.49049	0.17521	0.14574	3
16	Luxembourg	Western Europe	17	6.946	0.03499	1.56391	1.21963	0.91894	0.61583	0.37798	0.28034	1
17	Ireland	Western Europe	18	6.940	0.03676	1.33596	1.36948	0.89533	0.61777	0.28703	0.45901	1
18	Belgium	Western Europe	19	6.937	0.03595	1.30782	1.28566	0.89667	0.58450	0.22540	0.22250	2
19	United Arab Emirates	Middle East and Northern Africa	20	6.901	0.03729	1.42727	1.12575	0.80925	0.64157	0.38583	0.26428	2
20	United Kingdom	Western Europe	21	6.867	0.01866	1.26637	1.28548	0.90943	0.59625	0.32067	0.51912	1
21	Oman	Middle East and Northern Africa	22	6.853	0.05335	1.36011	1.08182	0.76276	0.63274	0.32524	0.21542	2
22	Venezuela	Latin America and Caribbean	23	6.810	0.06476	1.04424	1.25596	0.72052	0.42908	0.11069	0.05841	3
23	Singapore	Southeastern Asia	24	6.798	0.03780	1.52186	1.02000	1.02525	0.54252	0.49210	0.31105	1
24	Panama	Latin America and Caribbean	25	6.786	0.04910	1.06353	1.19850	0.79661	0.54210	0.09270	0.24434	2
25	Germany	Western Europe	26	6.750	0.01848	1.32792	1.29937	0.89186	0.61477	0.21843	0.28214	2
26	Chile	Latin America and Caribbean	27	6.670	0.05800	1.10715	1.12447	0.85857	0.44132	0.12869	0.33363	2
27	Qatar	Middle East and Northern Africa	28	6.611	0.06257	1.69042	1.07860	0.79733	0.64040	0.52208	0.32573	1
28	France	Western Europe	29	6.575	0.03512	1.27778	1.26038	0.94579	0.55011	0.20646	0.12332	2

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dy... Re...
29	Argentina	Latin America and Caribbean	30	6.574	0.04612	1.05351	1.24823	0.78723	0.44974	0.08484	0.11451	2
30	Czech Republic	Central and Eastern Europe	31	6.505	0.04168	1.17898	1.20643	0.84483	0.46364	0.02652	0.10686	2
31	Uruguay	Latin America and Caribbean	32	6.485	0.04539	1.06166	1.20890	0.81160	0.60362	0.24558	0.23240	2
32	Colombia	Latin America and Caribbean	33	6.477	0.05051	0.91861	1.24018	0.69077	0.53466	0.05120	0.18401	2
33	Thailand	Southeastern Asia	34	6.455	0.03557	0.96690	1.26504	0.73850	0.55664	0.03187	0.57630	2
34	Saudi Arabia	Middle East and Northern Africa	35	6.411	0.04633	1.39541	1.08393	0.72025	0.31048	0.32524	0.13706	2
35	Spain	Western Europe	36	6.329	0.03468	1.23011	1.31379	0.95562	0.45951	0.06398	0.18227	2
36	Malta	Western Europe	37	6.302	0.04206	1.20740	1.30203	0.88721	0.60365	0.13586	0.51752	1
37	Taiwan	Eastern Asia	38	6.298	0.03868	1.29098	1.07617	0.87530	0.39740	0.08129	0.25376	2
38	Kuwait	Middle East and Northern Africa	39	6.295	0.04456	1.55422	1.16594	0.72492	0.55499	0.25609	0.16228	1
39	Suriname	Latin America and Caribbean	40	6.269	0.09811	0.99534	0.97200	0.60820	0.59657	0.13633	0.16991	2
40	Trinidad and Tobago	Latin America and Caribbean	41	6.168	0.10895	1.21183	1.18354	0.61483	0.55884	0.01140	0.31844	2
41	El Salvador	Latin America and Caribbean	42	6.130	0.05618	0.76454	1.02507	0.67737	0.40350	0.11776	0.10692	3

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dy Re
42	Guatemala	Latin America and Caribbean	43	6.123	0.05224	0.74553	1.04356	0.64425	0.57733	0.09472	0.27489	2
43	Uzbekistan	Central and Eastern Europe	44	6.003	0.04361	0.63244	1.34043	0.59772	0.65821	0.30826	0.22837	2
44	Slovakia	Central and Eastern Europe	45	5.995	0.04267	1.16891	1.26999	0.78902	0.31751	0.03431	0.16893	2
45	Japan	Eastern Asia	46	5.987	0.03581	1.27074	1.25712	0.99111	0.49615	0.18060	0.10705	1
46	South Korea	Eastern Asia	47	5.984	0.04098	1.24461	0.95774	0.96538	0.33208	0.07857	0.18557	2
47	Ecuador	Latin America and Caribbean	48	5.975	0.04528	0.86402	0.99903	0.79075	0.48574	0.18090	0.11541	2
48	Bahrain	Middle East and Northern Africa	49	5.960	0.05412	1.32376	1.21624	0.74716	0.45492	0.30600	0.17362	1
49	Italy	Western Europe	50	5.948	0.03914	1.25114	1.19777	0.95446	0.26236	0.02901	0.22823	2

```
In [78]: a.sum()
```

```
Out[78]: Country                              SwitzerlandIcelandDenmarkNorwayCanadaFinlandNe...
         Region                               Western EuropeWestern EuropeWestern EuropeWest...
         Happiness Rank                                                                   1275
         Happiness Score                                                               336.452
         Standard Error                                                                2.17922
         Economy (GDP per Capita)                                                     60.88761
         Family                                                                       60.61385
         Health (Life Expectancy)                                                      41.7701
         Freedom                                                                      27.17041
         Trust (Government Corruption)                                                11.08659
         Generosity                                                                   13.65113
         Dystopia Residual                                                           121.27431
         dtype: object
```

```
In [79]: a.mean()
```

```
Out[79]: Happiness Rank                      25.500000
         Happiness Score                      6.729040
         Standard Error                       0.043584
         Economy (GDP per Capita)             1.217752
         Family                               1.212277
         Health (Life Expectancy)             0.835402
         Freedom                              0.543408
         Trust (Government Corruption)        0.221732
         Generosity                           0.273023
         Dystopia Residual                    2.425486
         dtype: float64
```

```
In [80]: a.count()
```

```
Out[80]: Country                          50
         Region                           50
         Happiness Rank                   50
         Happiness Score                  50
         Standard Error                   50
         Economy (GDP per Capita)         50
         Family                           50
         Health (Life Expectancy)         50
         Freedom                          50
         Trust (Government Corruption)    50
         Generosity                       50
         Dystopia Residual                50
         dtype: int64
```

In [81]: `a.describe()`

Out[81]:

	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dystopia Residual
count	50.00000	50.000000	50.000000	50.000000	50.000000	50.000000	50.000000	50.000000	50.000000	50.000000
mean	25.50000	6.729040	0.043584	1.217752	1.212277	0.835402	0.543408	0.221732	0.273023	2.425486
std	14.57738	0.511449	0.015482	0.216687	0.118959	0.105584	0.105589	0.142510	0.128078	0.436610
min	1.00000	5.948000	0.018480	0.632440	0.914510	0.597720	0.262360	0.011400	0.058410	1.556740
25%	13.25000	6.299000	0.035540	1.062128	1.135798	0.768877	0.468183	0.097498	0.170838	2.213390
50%	25.50000	6.768000	0.040795	1.268555	1.243645	0.868215	0.568085	0.196610	0.254365	2.426780
75%	37.75000	7.196750	0.046277	1.333112	1.298787	0.909165	0.631748	0.325240	0.339450	2.677328
max	50.00000	7.587000	0.108950	1.690420	1.402230	1.025250	0.669730	0.522080	0.576300	3.602140

```
In [82]: a.mode()
```

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dystop Residu
0	Argentina	Western Europe	1	5.948	0.01848	0.63244	0.91451	0.59772	0.26236	0.32524	0.05841	1.5567
1	Australia	NaN	2	5.960	0.01866	0.74553	0.95774	0.60820	0.31048	NaN	0.10686	1.6488
2	Austria	NaN	3	5.975	0.02799	0.76454	0.97200	0.61483	0.31751	NaN	0.10692	1.6843
3	Bahrain	NaN	4	5.984	0.03140	0.86402	0.99903	0.64425	0.33208	NaN	0.10705	1.7379
4	Belgium	NaN	5	5.987	0.03157	0.91861	1.02000	0.67737	0.39740	NaN	0.11451	1.8763
5	Brazil	NaN	6	5.995	0.03328	0.95578	1.02507	0.69077	0.40350	NaN	0.11541	1.8850
6	Canada	NaN	7	6.003	0.03371	0.96690	1.04356	0.69702	0.41319	NaN	0.12332	1.9696
7	Chile	NaN	8	6.123	0.03411	0.98124	1.07617	0.72025	0.42908	NaN	0.13706	1.9699
8	Colombia	NaN	9	6.130	0.03468	0.99534	1.07860	0.72052	0.44132	NaN	0.14074	1.9757
9	Costa Rica	NaN	10	6.168	0.03470	1.02054	1.08182	0.72492	0.44974	NaN	0.14574	2.0251
10	Czech Republic	NaN	11	6.269	0.03499	1.04424	1.08393	0.73850	0.45492	NaN	0.16228	2.1156
11	Denmark	NaN	12	6.295	0.03512	1.05351	1.12447	0.74716	0.45951	NaN	0.16893	2.1236
12	Ecuador	NaN	13	6.298	0.03553	1.06166	1.12575	0.76276	0.46364	NaN	0.16991	2.2112
13	El Salvador	NaN	14	6.302	0.03557	1.06353	1.16594	0.78723	0.48181	NaN	0.17362	2.2197
14	Finland	NaN	15	6.329	0.03581	1.10715	1.18354	0.78902	0.48574	NaN	0.18227	2.2374
15	France	NaN	16	6.411	0.03595	1.16891	1.19777	0.79075	0.49049	NaN	0.18401	2.2463
16	Germany	NaN	17	6.455	0.03676	1.17898	1.19850	0.79661	0.49615	NaN	0.18557	2.2474
17	Guatemala	NaN	18	6.477	0.03729	1.20740	1.20643	0.79733	0.53466	NaN	0.21542	2.2642
18	Iceland	NaN	19	6.485	0.03751	1.21183	1.20890	0.80925	0.54210	NaN	0.22250	2.2664
19	Ireland	NaN	20	6.505	0.03780	1.22857	1.21624	0.81160	0.54252	NaN	0.22823	2.2688
20	Israel	NaN	21	6.574	0.03839	1.23011	1.21963	0.81444	0.54604	NaN	0.22837	2.3194
21	Italy	NaN	22	6.575	0.03868	1.24461	1.22393	0.84483	0.55011	NaN	0.23240	2.3214
22	Japan	NaN	23	6.611	0.03880	1.25018	1.23287	0.85857	0.55499	NaN	0.23351	2.3232
23	Kuwait	NaN	24	6.670	0.03914	1.25114	1.23788	0.86027	0.55664	NaN	0.24434	2.3711

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dystop Residu
24	Luxembourg	NaN	25	6.750	0.04076	1.26637	1.24018	0.86179	0.55884	NaN	0.25376	2.414
25	Malta	NaN	26	6.786	0.04083	1.27074	1.24711	0.87464	0.57733	NaN	0.25497	2.4387
26	Mexico	NaN	27	6.798	0.04098	1.27778	1.24823	0.87530	0.58450	NaN	0.26428	2.451
27	Netherlands	NaN	28	6.810	0.04168	1.29025	1.25596	0.88521	0.59625	NaN	0.27489	2.465
28	New Zealand	NaN	29	6.853	0.04176	1.29098	1.25712	0.88721	0.59657	NaN	0.28034	2.465
29	Norway	NaN	30	6.867	0.04206	1.30232	1.26038	0.88911	0.60362	NaN	0.28214	2.474
30	Oman	NaN	31	6.901	0.04267	1.30782	1.26504	0.89042	0.60365	NaN	0.29678	2.492
31	Panama	NaN	32	6.937	0.04361	1.32376	1.26999	0.89186	0.61477	NaN	0.31105	2.510
32	Qatar	NaN	33	6.940	0.04454	1.32548	1.28017	0.89284	0.61576	NaN	0.31844	2.517
33	Saudi Arabia	NaN	34	6.946	0.04456	1.32629	1.28548	0.89533	0.61583	NaN	0.32573	2.533
34	Singapore	NaN	35	6.983	0.04528	1.32792	1.28566	0.89667	0.61777	NaN	0.33088	2.539
35	Slovakia	NaN	36	7.119	0.04539	1.32944	1.28907	0.90563	0.62433	NaN	0.33172	2.619
36	South Korea	NaN	37	7.187	0.04612	1.33171	1.29704	0.90837	0.62877	NaN	0.33363	2.675
37	Spain	NaN	38	7.200	0.04633	1.33358	1.29937	0.90943	0.63274	NaN	0.34139	2.677
38	Suriname	NaN	39	7.226	0.04884	1.33596	1.30203	0.91087	0.63297	NaN	0.34699	2.702
39	Sweden	NaN	40	7.278	0.04910	1.33723	1.30923	0.91387	0.63376	NaN	0.36262	2.742
40	Switzerland	NaN	41	7.284	0.05051	1.36011	1.31379	0.91894	0.63938	NaN	0.40105	2.790
41	Taiwan	NaN	42	7.286	0.05224	1.39451	1.31826	0.93156	0.64040	NaN	0.43562	2.836
42	Thailand	NaN	43	7.364	0.05335	1.39541	1.31967	0.94143	0.64157	NaN	0.43630	2.848
43	Trinidad and Tobago	NaN	44	7.378	0.05412	1.39651	1.32261	0.94579	0.64169	NaN	0.45811	2.857
44	United Arab Emirates	NaN	45	7.406	0.05618	1.42727	1.33095	0.94784	0.64938	NaN	0.45901	3.035
45	United Kingdom	NaN	46	7.427	0.05800	1.45900	1.34043	0.95446	0.65124	NaN	0.47501	3.088
46	United States	NaN	47	7.522	0.06257	1.52186	1.34951	0.95562	0.65821	NaN	0.47610	3.177

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	Generosity	Dystop Residu
47	Uruguay	NaN	48	7.527	0.06476	1.55422	1.36058	0.96538	0.65980	NaN	0.51752	3.1913
48	Uzbekistan	NaN	49	7.561	0.09811	1.56391	1.36948	0.99111	0.66557	NaN	0.51912	3.2600
49	Venezuela	NaN	50	7.587	0.10895	1.69042	1.40223	1.02525	0.66973	NaN	0.57630	3.6021

In [83]: `a.cumsum()`

4	SwitzerlandIcelandDenmarkNorwayCanada	EuropeWestern EuropeWest...	15	37.624	0.19056	6.80960	6.76588	4.554
5	SwitzerlandIcelandDenmarkNorwayCanadaFinland	Western EuropeWestern EuropeWestern EuropeWest...	21	45.030	0.22196	8.09985	8.08414	5.443
6	SwitzerlandIcelandDenmarkNorwayCanadaFinlandNe...	Western EuropeWestern EuropeWestern EuropeWest...	28	52.408	0.24995	9.42929	9.36431	6.336
7	SwitzerlandIcelandDenmarkNorwayCanadaFinlandNe...	Western EuropeWestern EuropeWestern EuropeWest...	36	59.772	0.28152	10.76100	10.65338	7.247
8	SwitzerlandIcelandDenmarkNorwayCanadaFinlandNe...	Western EuropeWestern EuropeWestern EuropeWest...	45	67.058	0.31523	12.01118	11.97305	8.155
		Western						

```
In [84]: a.min()
```

Out[84]: Country   Argentina
         Region   Australia and New Zealand
         Happiness Rank   1
         Happiness Score   5.948
         Standard Error   0.01848
         Economy (GDP per Capita)   0.63244
         Family   0.91451
         Health (Life Expectancy)   0.59772
         Freedom   0.26236
         Trust (Government Corruption)   0.0114
         Generosity   0.05841
         Dystopia Residual   1.55674
         dtype: object

```
In [85]: a.max()
```

Out[85]: Country   Venezuela
         Region   Western Europe
         Happiness Rank   50
         Happiness Score   7.587
         Standard Error   0.10895
         Economy (GDP per Capita)   1.69042
         Family   1.40223
         Health (Life Expectancy)   1.02525
         Freedom   0.66973
         Trust (Government Corruption)   0.52208
         Generosity   0.5763
         Dystopia Residual   3.60214
         dtype: object

```
In [86]: from numpy import cov
```

```
In [88]: cov(a['Freedom'],a['Generosity'])
```

Out[88]: array([[0.01114909, 0.00695685],
                [0.00695685, 0.01640397]])
```

```
In [90]:  from scipy.stats import pearsonr
          pearsonr(a['Standard Error'],a['Health (Life Expectancy)'])

Out[90]:  (-0.6482603489799212, 3.5806406679723376e-07)


In [92]:  from scipy.stats import spearmanr
          spearmanr(a['Dystopia Residual'],a['Standard Error'])

Out[92]:  SpearmanrResult(correlation=0.2712605042016807, pvalue=0.05671714197914376)


In [ ]:
```