PART - 1

Importing necessary libraries

In [205]:

```
import pandas as pd
import numpy as np
import requests

from bs4 import BeautifulSoup
```

Making a request to the website

In [206]:

```
source = requests.get('https://www.worldometers.info/coronavirus/')
```

Creating a beautiful soup object

In [207]:

```
soup  = BeautifulSoup(source.content, features= 'html.parser')
```

Scraping the information step by step

1. Identifying the required table:

In [208]:

```
table = soup.find(id = "main_table_countries_today")
```

---

1. get the information row wise since there doesnt seem to be unique class for each column.

In [209]:

```
thead = table.find('thead')
```

In [210]:

```
th = thead.find_all('th')
```

1. Get the tbodies and from there extract info about each row

In [211]:

```
tbody = table.find('tbody')
```

In [212]:

```
row_info = tbody.find_all('tr')
```

In [213]:

```
row_info = row_info[8:]
```

1. By inspecting we understand the required columns as : 1,2,4,12,14

In [214]:

```
def create_df(x):
  """
  This function takes in the beautiful soup object of the table body and returns the da
taframe with required information
  """
  #creating a disctionary to store the required values row wise:
  dic = {
      'country' : [],
      'cases': [],
      'deaths': [],
      'tests' : [],
      'population':[]
  }

  #loop to find all the column values:
  for row in x:
    r = row.find_all('td')

    #country name:
    dic['country'].append(r[1].text)

    #total cases:
    a = r[2].text.strip()
    if a == 'N/A' or a == '':
      dic['cases'].append(None)
    else:
      dic['cases'].append(int(a.replace(',','')))

    #total deaths:
    a = r[4].text.strip()
    if a == 'N/A' or a == '':
      dic['deaths'].append(None)
    else:
      dic['deaths'].append(int(a.replace(',','')))

    #total test:
    a = r[12].text.strip()
    if a == 'N/A' or a ==  '':
      dic['tests'].append(None)
    else:
      dic['tests'].append(int(a.replace(',','')))

    #population:
    a = r[14].text.strip()
    if a == 'N/A' or a =='':
      dic['population'].append(None)
    else:
      dic['population'].append(int(a.replace(',','')))

  return pd.DataFrame(dic)
```

1. Creating the dataframe

In [215]:

```
data_df = create_df(row_info)
print(data_df.head())
```

```
   country      cases     deaths         tests    population
0      USA  105020461  1142981.0  1.163387e+09  3.348053e+08
1    India   44685257   530762.0  9.179870e+08  1.406632e+09
2   France   39595964   164791.0  2.714902e+08  6.558452e+07
3  Germany   38043874   167491.0  1.223324e+08  8.388360e+07
4   Brazil   36987682   698047.0  6.377617e+07  2.153536e+08
```

---

1. setting country as the index

In [216]:

```
data_df = data_df.set_index('country')
print(data_df.head())
```

```
             cases     deaths         tests    population
country
USA      105020461  1142981.0  1.163387e+09  3.348053e+08
India     44685257   530762.0  9.179870e+08  1.406632e+09
France    39595964   164791.0  2.714902e+08  6.558452e+07
Germany   38043874   167491.0  1.223324e+08  8.388360e+07
Brazil    36987682   698047.0  6.377617e+07  2.153536e+08
```

---

1. Dropping the columns with null values:

In [217]:

```
data_df = data_df.dropna()
```

In [218]:

```
print(data_df.shape)
```

```
(212, 4)
```

In [219]:

```
data_df.isnull().sum()
```

Out[219]:

```
cases         0
deaths        0
tests         0
population    0
dtype: int64
```

As we can see, we have dropped all the null columns.

1. Converting the object types to integer

In [220]:

```
data_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 212 entries, USA to China
Data columns (total 4 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   cases       212 non-null    int64  
 1   deaths      212 non-null    float64
 2   tests       212 non-null    float64
 3   population  212 non-null    float64
dtypes: float64(3), int64(1)
memory usage: 8.3+ KB
```

In [221]:

```
data_df.deaths = data_df.deaths.astype(int)
data_df.tests = data_df.tests.astype(int)
data_df.population = data_df.population.astype(int)
```

```
/usr/local/lib/python3.8/dist-packages/pandas/core/generic.py:5516: Settin
gWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  self[name] = value
```

In [222]:

```
data_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 212 entries, USA to China
Data columns (total 4 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   cases       212 non-null    int64
 1   deaths      212 non-null    int64
 2   tests       212 non-null    int64
 3   population  212 non-null    int64
dtypes: int64(4)
memory usage: 8.3+ KB
```

1. total deaths = 0 / total tests = 0

In [223]:

```
data_df[(data_df.tests ==0) | (data_df.deaths == 0)]
```

Out[223]:

country	cases	deaths	tests	population

This is becasue while creating the dataframe itself i have taken care of those cases.

---

1. Tests per case:

In [224]:

```
data_df['test_per_case'] = data_df.tests/data_df.cases
```

```
<ipython-input-224-198cee0852a8>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data_df['test_per_case'] = data_df.tests/data_df.cases
```

In [225]:

```
data_df.head()
```

Out[225]:

country	cases	deaths	tests	population	test_per_case
USA	105020461	1142981	1163387226	334805269	11.077720
India	44685257	530762	917986992	1406631776	20.543397
France	39595964	164791	271490188	65584518	6.856512
Germany	38043874	167491	122332384	83883596	3.215561
Brazil	36987682	698047	63776166	215353593	1.724254

---

1. sorting the table:

In [226]:

```
#descending order:
data_df = data_df.sort_values(by = ['test_per_case'],ascending = False)
```

In [227]:

```
print(data_df.head(20))
```

country	cases	deaths	tests	population	test_per_case
China	503302	5272	160000000	1448471400	317.900585
UAE	1051336	2348	199104417	10081785	189.382288
Turks and Caicos	6551	38	611527	39741	93.348649
Oman	399449	4628	25000000	5323993	62.586213
Bermuda	18791	159	1026742	61939	54.640094
Saudi Arabia	829041	9606	45121063	35844909	54.425611
Rwanda	133170	1468	5959042	13600464	44.747631
Denmark	3174758	8237	129185732	5834950	40.691521
Bhutan	62611	21	2303734	787941	36.794397
Austria	5871234	21825	211273524	9066710	35.984518
Spain	13755956	119186	471036328	46719142	34.242355
Sierra Leone	7760	126	259958	8306436	33.499742
Gabon	48981	306	1621909	2331533	33.113023
Tonga	16801	13	535009	107749	31.843878
Yemen	11945	2159	329592	31154867	27.592465
Hong Kong	2882553	13445	76127725	7604299	26.409827
Gibraltar	20420	111	534283	33704	26.164691
Niger	9931	312	254538	26083660	25.630651
Chad	7675	194	191341	17413580	24.930423
Mali	32946	743	794233	21473764	24.107115

In [228]:

```
#ascending order:
print(data_df.sort_values(by = ['test_per_case']).head(20))
```

```
                         cases  deaths     tests  population  test_per_ca
se
country
S. Korea                30458857   33887  15804065    51329899       0.5188
66
Algeria                   271428    6881    230861    45350148       0.8505
42
New Caledonia              79871     314     98964      290915       1.2390
48
Brazil                  36987682  698047  63776166   215353593       1.7242
54
Antigua and Barbuda         9106     146     18901       99509       2.0756
64
Vanuatu                    12014      14     24976      321832       2.0789
08
Slovenia                 1326367    7067   2834333     2078034       2.1369
15
Macao                       3513     121      7850      667490       2.2345
57
Bolivia                  1192246   22362   2705422    11992656       2.2691
81
Micronesia                 23671      60     54967      117489       2.3221
24
Eritrea                    10189     103     23693     3662244       2.3253
51
Syria                      57463    3164    146269    19364809       2.5454
47
Caribbean Netherlands      11668      38     30126       26647       2.5819
33
Brunei                    276825     225    717784      445431       2.5929
16
Mexico                   7430816  332850  19519260   131562772       2.6267
99
Cook Islands               7025       2     19690       17571       2.8028
47
Japan                   33136016   71923  94608068   125584838       2.8551
43
Ecuador                  1056578   36008   3082403    18113361       2.9173
45
Suriname                   82227    1400    240907      596831       2.9297
80
Netherlands              8591721   22992  25984435    17211447       3.0243
57
```

Conclusion:

The country with the highest test per case is china and the country with the lowest test per case is north korea. It does not look like that the test_per_Case has any kind of effect in preventing the deaths, but lets plot some graphs to investigate this clearly.

In [229]:

```
df_low = data_df.sort_values(by = ['test_per_case']).head(20)
df_low['death_ratio'] = df_low.deaths/df_low.population
df_low
```

Out[229]:

country	cases	deaths	tests	population	test_per_case	death_ratio
S. Korea	30458857	33887	15804065	51329899	0.518866	0.000660
Algeria	271428	6881	230861	45350148	0.850542	0.000152
New Caledonia	79871	314	98964	290915	1.239048	0.001079
Brazil	36987682	698047	63776166	215353593	1.724254	0.003241
Antigua and Barbuda	9106	146	18901	99509	2.075664	0.001467
Vanuatu	12014	14	24976	321832	2.078908	0.000044
Slovenia	1326367	7067	2834333	2078034	2.136915	0.003401
Macao	3513	121	7850	667490	2.234557	0.000181
Bolivia	1192246	22362	2705422	11992656	2.269181	0.001865
Micronesia	23671	60	54967	117489	2.322124	0.000511
Eritrea	10189	103	23693	3662244	2.325351	0.000028
Syria	57463	3164	146269	19364809	2.545447	0.000163
Caribbean Netherlands	11668	38	30126	26647	2.581933	0.001426
Brunei	276825	225	717784	445431	2.592916	0.000505
Mexico	7430816	332850	19519260	131562772	2.626799	0.002530
Cook Islands	7025	2	19690	17571	2.802847	0.000114
Japan	33136016	71923	94608068	125584838	2.855143	0.000573
Ecuador	1056578	36008	3082403	18113361	2.917345	0.001988
Suriname	82227	1400	240907	596831	2.929780	0.002346
Netherlands	8591721	22992	25984435	17211447	3.024357	0.001336

In [230]:

```
df_high = data_df.sort_values(by = ['test_per_case'], ascending = False).head(20)
df_high['death_ratio'] = df_high.deaths/df_high.population
df_high
```

Out[230]:

country	cases	deaths	tests	population	test_per_case	death_ratio
China	503302	5272	160000000	1448471400	317.900585	0.000004
UAE	1051336	2348	199104417	10081785	189.382288	0.000233
Turks and Caicos	6551	38	611527	39741	93.348649	0.000956
Oman	399449	4628	25000000	5323993	62.586213	0.000869
Bermuda	18791	159	1026742	61939	54.640094	0.002567
Saudi Arabia	829041	9606	45121063	35844909	54.425611	0.000268
Rwanda	133170	1468	5959042	13600464	44.747631	0.000108
Denmark	3174758	8237	129185732	5834950	40.691521	0.001412
Bhutan	62611	21	2303734	787941	36.794397	0.000027
Austria	5871234	21825	211273524	9066710	35.984518	0.002407
Spain	13755956	119186	471036328	46719142	34.242355	0.002551
Sierra Leone	7760	126	259958	8306436	33.499742	0.000015
Gabon	48981	306	1621909	2331533	33.113023	0.000131
Tonga	16801	13	535009	107749	31.843878	0.000121
Yemen	11945	2159	329592	31154867	27.592465	0.000069
Hong Kong	2882553	13445	76127725	7604299	26.409827	0.001768
Gibraltar	20420	111	534283	33704	26.164691	0.003293
Niger	9931	312	254538	26083660	25.630651	0.000012
Chad	7675	194	191341	17413580	24.930423	0.000011
Mali	32946	743	794233	21473764	24.107115	0.000035

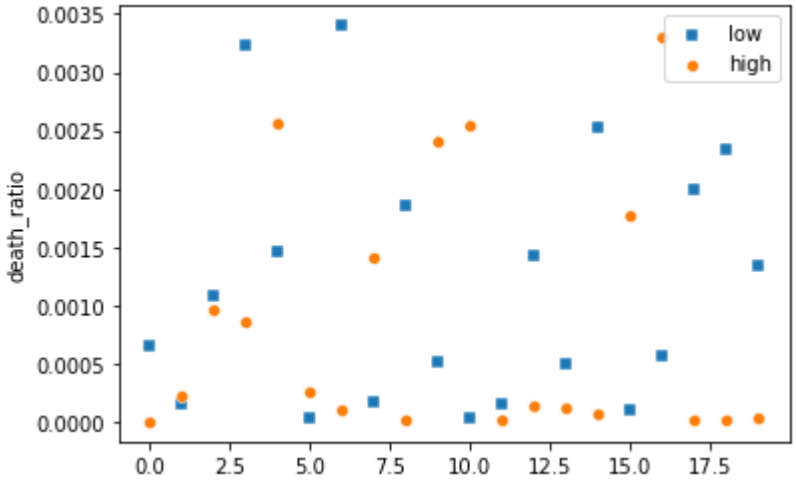
In [231]:

```
import matplotlib.pyplot as plt
import seaborn as sns

%matplotlib inline
```

In [239]:

```
sns.scatterplot(x = np.arange(20), y = df_low.death_ratio, marker = 's')
sns.scatterplot(x = np.arange(20), y = df_high.death_ratio)
plt.legend(['low','high']);
```



In [233]:

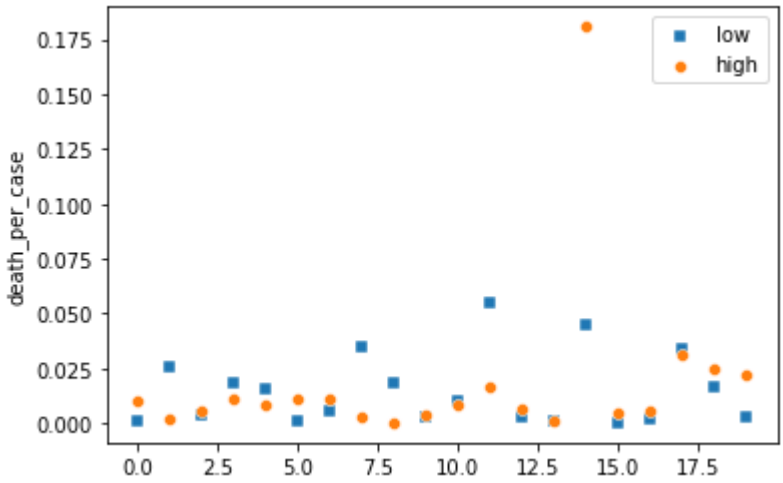
```
df_high['death_per_case'] = df_high['deaths']/df_high['cases']
df_low['death_per_case'] = df_low['deaths']/df_low['cases']
```

In [234]:

```
sns.scatterplot(x = np.arange(20), y = df_low.death_per_case, marker = 's')
sns.scatterplot(x = np.arange(20), y = df_high.death_per_case)
plt.legend(['low','high'])
```

Out[234]:

```
<matplotlib.legend.Legend at 0x7fa9a90c4220>
```



In [235]:

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
```

In [236]:

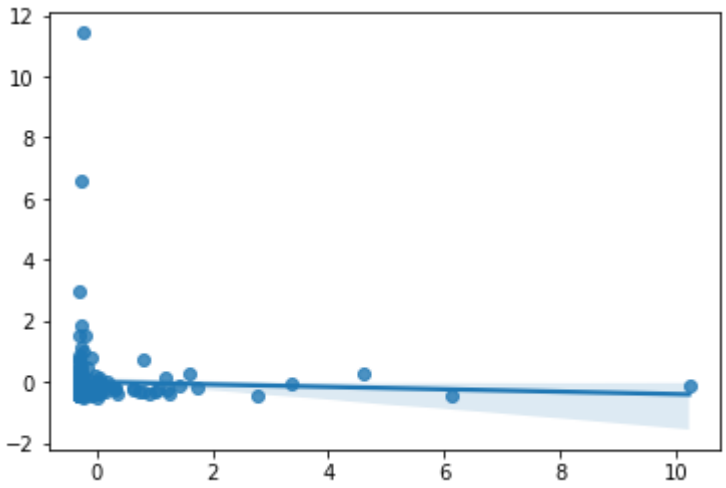
```
df = scaler.fit_transform(data_df)
```

In [237]:

```
sns.regplot(x = df[:,1], y = df[:,4])
```

Out[237]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa9a90fc250>
```



No matter how I look at it, there doesn't seem to be much effect of increasing the tests done per a case in preventing the deaths.