Task 1, Team: Comparing US against 5 similarly sized countries

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

df_deaths = pd.read_csv('data/cumulative-deaths-per-100k.csv')
df_deaths.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 428419 entries, 0 to 428418
Data columns (total 7 columns):
 #   Column
Non-Null Count   Dtype
---  ------
--------------   -----
 0   Entity
428419 non-null  object
 1   Code
402784 non-null  object
 2   Day
428419 non-null  object
 3   Cumulative excess deaths per 100,000 people (central estimate)
55458 non-null   float64
 4   Cumulative excess deaths per 100,000 people (95% CI, lower bound)
55458 non-null   float64
 5   Cumulative excess deaths per 100,000 people (95% CI, upper bound)
55458 non-null   float64
 6   Total confirmed deaths due to COVID-19 per 100,000 people
427250 non-null  float64
dtypes: float64(4), object(3)
memory usage: 22.9+ MB
```

Here we observe the dataset and have found column 0 (Entity/Country), 1 (Day/Date), and 6 (Total confirmed deaths) are of our interest

```
def country_deaths(country):
    return df_deaths.loc[(df_deaths['Entity']==country,
df_deaths.columns[:])].loc[(df_deaths['Day']>'2020-05-31') &
(df_deaths['Day']<'2021-01-04')].sort_values(by='Day')

country_deaths('Bangladesh')
```

```
          Entity Code         Day  \
32509  Bangladesh  BGD  2020-06-01
32848  Bangladesh  BGD  2020-06-02
32849  Bangladesh  BGD  2020-06-03
32850  Bangladesh  BGD  2020-06-04
32851  Bangladesh  BGD  2020-06-05
```

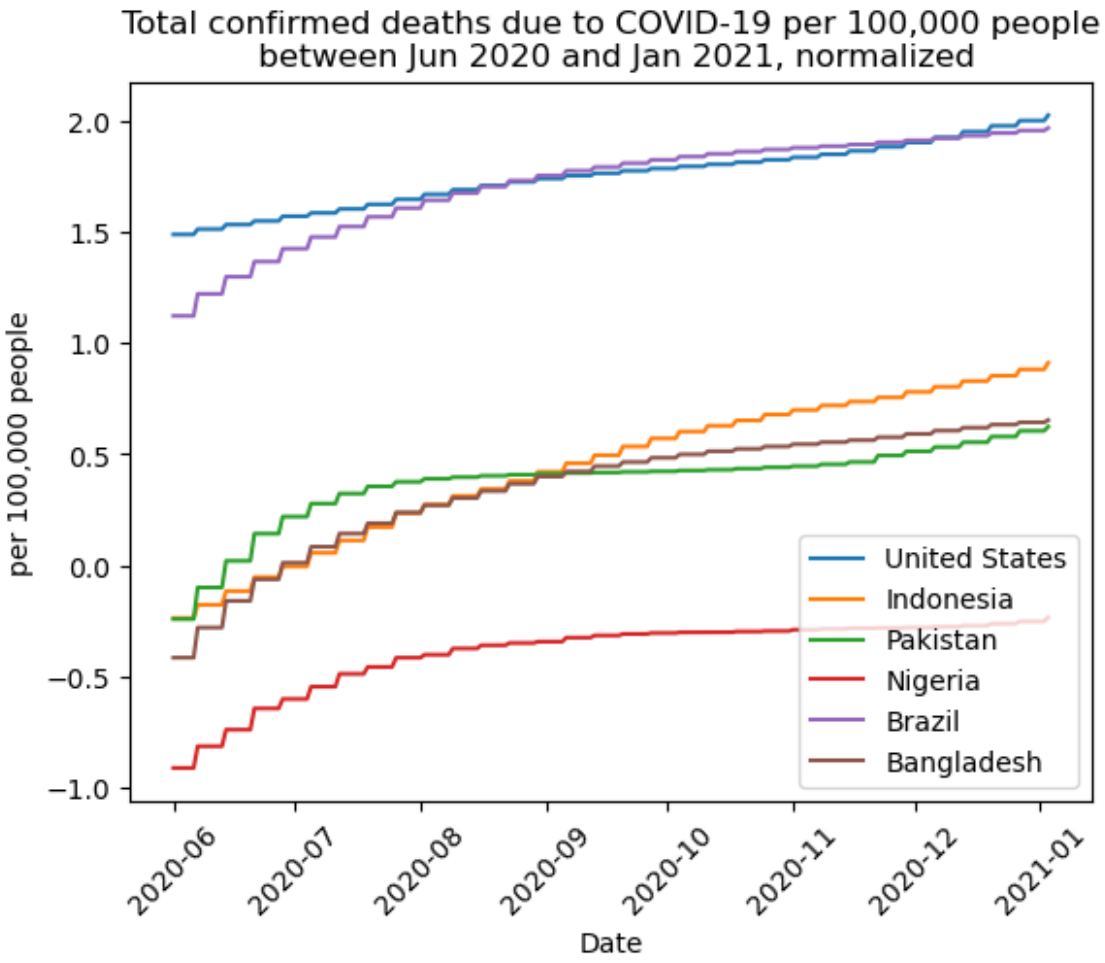
```
...           ...  ...         ...
33029  Bangladesh  BGD  2020-12-30
33030  Bangladesh  BGD  2020-12-31
33031  Bangladesh  BGD  2021-01-01
33032  Bangladesh  BGD  2021-01-02
33033  Bangladesh  BGD  2021-01-03

       Cumulative excess deaths per 100,000 people (central estimate)
\
32509                                                  11.681056

32848                                                        NaN

32849                                                        NaN

32850                                                        NaN

32851                                                        NaN

...                                                          ...

33029                                                        NaN

33030                                                        NaN

33031                                                        NaN

33032                                                        NaN

33033                                                        NaN


       Cumulative excess deaths per 100,000 people (95% CI, lower
bound)  \
32509                                                  -8.701433

32848                                                        NaN

32849                                                        NaN

32850                                                        NaN

32851                                                        NaN

...                                                          ...

33029                                                        NaN

33030                                                        NaN

33031                                                        NaN
```

```
33032                                                    NaN

33033                                                    NaN


       Cumulative excess deaths per 100,000 people (95% CI, upper
bound)  \
32509                                              18.71303

32848                                                    NaN

32849                                                    NaN

32850                                                    NaN

32851                                                    NaN

...                                                      ...

33029                                                    NaN

33030                                                    NaN

33031                                                    NaN

33032                                                    NaN

33033                                                    NaN


       Total confirmed deaths due to COVID-19 per 100,000 people
32509                                              0.383741
32848                                              0.383741
32849                                              0.383741
32850                                              0.383741
32851                                              0.383741
...                                                     ...
33029                                              4.399448
33030                                              4.399448
33031                                              4.399448
33032                                              4.399448
33033                                              4.502173

[217 rows x 7 columns]
```

Implemented a function to reduce repeated code, with these goals:

- Select the country of interest by name
- Trim off date outside our scope
- Sort the dataframe by date

```
def draw_normalized(*countries):
    for country in countries:
        df = country_deaths(country)
        x = df.loc[:,'Day'].values
        x = np.asarray(x, dtype='datetime64[s]')
        y = np.log10(df.loc[:,df.columns[6]].values)
        plt.plot(x, y, label = country)
    plt.title("Total confirmed deaths due to COVID-19 per 100,000
people\n between Jun 2020 and Jan 2021, normalized")
    plt.xlabel("Date")
    plt.xticks(rotation=45)
    plt.ylabel("per 100,000 people")
    plt.legend()
    plt.show()

draw_normalized('United
States','Indonesia','Pakistan','Nigeria','Brazil','Bangladesh')
```



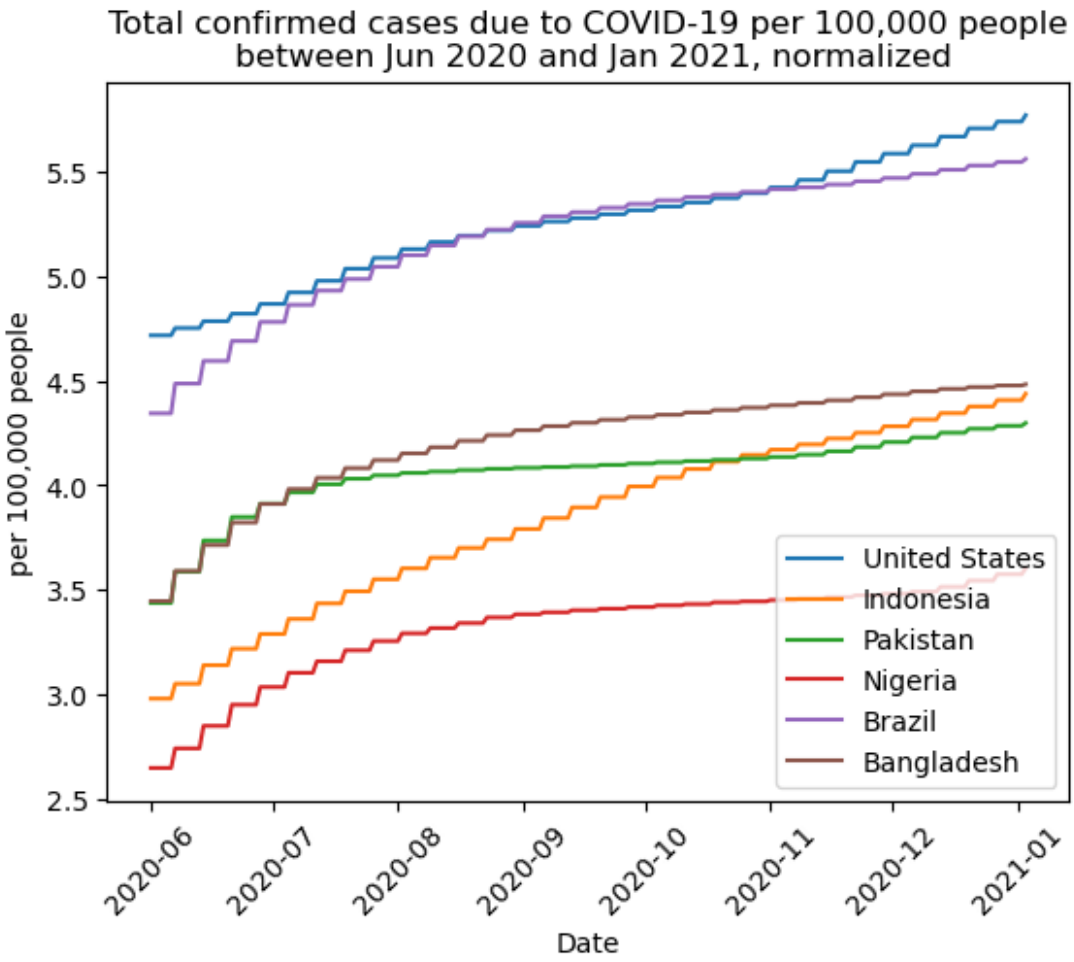
Implemented a function to call the previous dataframe trimming function, normalize the data and then plot them on the graph.

```
df_confirmed = pd.read_csv('data/total-confirmed-cases-per-1m.csv')
df_confirmed.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 427250 entries, 0 to 427249
Data columns (total 4 columns):
 #   Column                                                  Non-Null
Count   Dtype
---  ------
--------------   -----
 0   Entity                                                  427250 non-
null  object
 1   Code                                                    401615 non-
null  object
 2   Day                                                     427250 non-
null  object
 3   Total confirmed cases of COVID-19 per million people  427250 non-
null  float64
dtypes: float64(1), object(3)
memory usage: 13.0+ MB
```

Observing the dataset for confirmed cases per 1 million, found column 0, 1, 3 are of our interest

```
def country_confirmed(country):
    return df_confirmed.loc[(df_confirmed['Entity']==country,
df_confirmed.columns[:])].loc[(df_confirmed['Day']>'2020-05-31') &
(df_confirmed['Day']<'2021-01-04')].sort_values(by='Day')
def draw_normalized(*countries):
    for country in countries:
        df = country_confirmed(country)
        x = df.loc[:, 'Day'].values
        x = np.asarray(x, dtype='datetime64[s]')
        y = np.log10(df.loc[:, df.columns[3]].values * 10)
        plt.plot(x, y, label=country)
    plt.title("Total confirmed cases due to COVID-19 per 100,000
people\n between Jun 2020 and Jan 2021, normalized")
    plt.xlabel("Date")
    plt.xticks(rotation=45)
    plt.ylabel("per 100,000 people")
    plt.legend()
    plt.show()


draw_normalized('United States', 'Indonesia', 'Pakistan', 'Nigeria',
'Brazil', 'Bangladesh')
```



Took the same approach from plotting confirmed death to plot total confirmed cases. Note that the data was for "per 1 million people" so we x10 the data to get the desired "per 100k people" result