ass1

March 28, 2023

[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

Problem a.

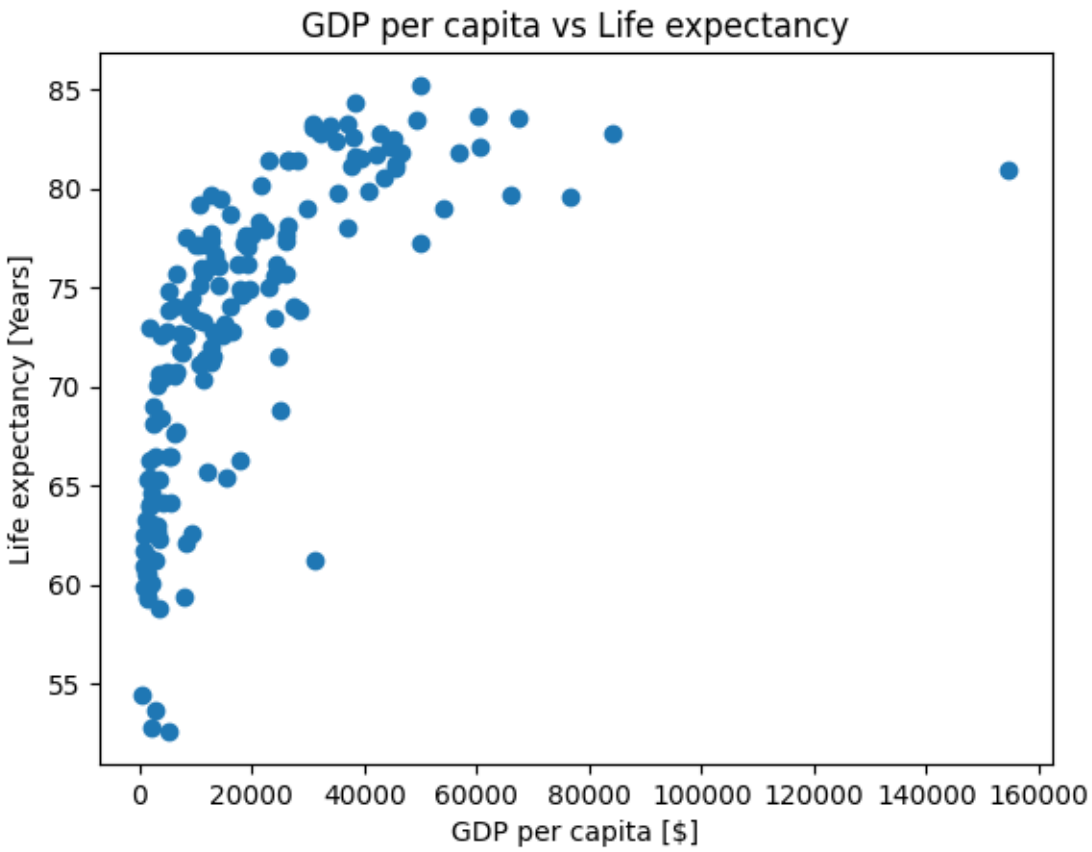
[ ]:
```
# Read and filter csv data to dataframes
le = pd.read_csv('life-expectancy.csv')
le = (le[le["Year"] == 2018])
le = le.drop(
    columns = ['Code', 'Year']
)
le = le.dropna()

gdp = pd.read_csv('gdp-per-capita-maddison-2020.csv')
gdp = (gdp[gdp["Year"] == 2017])
gdp = gdp.drop(
    columns = ['Code', 'Year', '417485-annotations']
)
gdp = gdp.dropna()

# Merge dataframes
le_gdp = pd.merge(le, gdp)

# Scatter plot data
plt.figure(1)
plt.scatter(le_gdp['GDP per capita'], le_gdp['Life expectancy at birth␣
 ↪(historical)'])
plt.xlabel('GDP per capita [$]')
plt.ylabel('Life expectancy [Years]')
plt.title('GDP per capita vs Life expectancy')
```

[ ]:
```
Text(0.5, 1.0, 'GDP per capita vs Life expectancy')
```



Problem b.

[ ]:
```
# Calculate mean and STD of life expectancy
mean = le_gdp['Life expectancy at birth (historical)'].mean()
std = le_gdp['Life expectancy at birth (historical)'].std()

# Remove entry 'World' from dataframe
le_gdp = le_gdp[le_gdp.Entity != 'World']

# Filter data on values higher than one STD over mean
le_above_std = le_gdp[(le_gdp['Life expectancy at birth (historical)'] > (mean␣
 ↪+ std))]
le_above_std = le_above_std.sort_values(by='Life expectancy at birth␣
 ↪(historical)', ascending=False)

print(le_above_std)
```

```
            Entity  Life expectancy at birth (historical)  GDP per capita
64    Hong Kong       85.2                                  49918.600
75    Japan           84.3                                  38414.863
```

142	Switzerland	83.6	60171.440
134	Singapore	83.5	67331.030
6	Australia	83.4	49265.613
93	Malta	83.3	30901.930
138	South Korea	83.3	37093.215
73	Italy	83.2	34027.336
139	Spain	83.1	30908.120
112	Norway	82.8	84056.336
66	Iceland	82.8	42978.234
72	Israel	82.8	32339.092
52	France	82.6	37895.000
141	Sweden	82.5	45192.742
106	New Zealand	82.4	34875.950
24	Canada	82.1	44591.640
71	Ireland	82.1	60544.277
105	Netherlands	81.8	46650.754
88	Luxembourg	81.8	56779.550
7	Austria	81.7	42177.370
51	Finland	81.6	38366.560
13	Belgium	81.5	39352.164
37	Cyprus	81.4	26445.287
121	Portugal	81.4	26298.791
58	Greece	81.4	22959.121
136	Slovenia	81.4	28190.180
56	Germany	81.2	45619.785
156	United Kingdom	81.1	37782.830
40	Denmark	81.0	45455.555
123	Qatar	80.9	154669.030
144	Taiwan	80.5	43503.793

Problem c.

[ ]:
```
# Read GDP data and filter to dataframe
total_gdp = pd.read_csv('gross-domestic-product.csv')
total_gdp = (total_gdp[total_gdp['Year'] == 2018])
total_gdp = total_gdp.drop(columns=['Code', 'Year'])

# Merge GDP with life expectancy
le_tot_gdp = pd.merge(le, total_gdp)

# Remove entry 'World' from dataframe
le_tot_gdp = le_tot_gdp[le_tot_gdp.Entity != 'World']

# Calculate mean of GDP
gdp_mean = le_tot_gdp['GDP (constant 2015 US$)'].mean()

# Sort dataframe after GDP
```

```
le_tot_gdp = le_tot_gdp.sort_values(by='GDP (constant 2015 US$)',␣
 ↪ascending=False)

# Filter data on GDP lower than mean
hi_le_lo_gdp = le_tot_gdp[(le_tot_gdp['GDP (constant 2015 US$)'] < (gdp_mean))]

# Filter data on life expectancy higher than one STD over mean
hi_le_lo_gdp = hi_le_lo_gdp[(hi_le_lo_gdp['Life expectancy at birth␣
 ↪(historical)'] > (mean + std))]

print(hi_le_lo_gdp)
```

	Entity	Life expectancy at birth (historical)	GDP (constant 2015 US$)
86	Ireland	82.1	353404289024
164	Singapore	83.5	344278302720
88	Israel	82.8	340224147456
79	Hong Kong	85.2	337417502720
50	Denmark	81.0	327708278784
62	Finland	81.6	251667480576
147	Portugal	81.4	216552783872
69	Greece	81.4	200141373440
130	New Zealand	82.4	197515558912
149	Qatar	80.9	166227181568
106	Luxembourg	81.8	65173360640
107	Macao	84.9	52389965824
167	Slovenia	81.4	48687501312
47	Cyprus	81.4	23632267264
81	Iceland	82.8	20351811584
113	Malta	83.3	13129078784
87	Isle of Man	80.6	8108785152
20	Bermuda	80.8	6819906048
120	Monaco	86.5	6623285760
4	Andorra	83.0	2949506304
157	San Marino	82.9	1478921088

Problem d.

[ ]:
```
# Load GDP data
total_gdp = pd.read_csv('gross-domestic-product.csv')

# Only include data from 2018
total_gdp = (total_gdp[total_gdp['Year'] == 2018])

# Merge data for GDP and life expectancy
hi_gdp_lo_le = pd.merge(total_gdp, le)

# Remove irrelevant columns and 'World' entry
hi_gdp_lo_le = hi_gdp_lo_le.drop(columns=['Code', 'Year'])
```

```
hi_gdp_lo_le = hi_gdp_lo_le[hi_gdp_lo_le.Entity != 'World']

# Calculate mean and standard deviation for GDP
gdp_mean = hi_gdp_lo_le['GDP (constant 2015 US$)'].mean()
gdp_std = hi_gdp_lo_le['GDP (constant 2015 US$)'].std()

# Filter GDP and life expectancy based on mean and standard deviation
hi_gdp_lo_le = hi_gdp_lo_le[(hi_gdp_lo_le['GDP (constant 2015 US$)'] >␣
 ↪gdp_mean)]
hi_gdp_lo_le = hi_gdp_lo_le[(hi_gdp_lo_le['Life expectancy at birth␣
 ↪(historical)'] < mean)]
hi_gdp_lo_le = hi_gdp_lo_le.sort_values(by='GDP (constant 2015 US$)',␣
 ↪ascending=False)

print(hi_gdp_lo_le)
```

```
       Entity  GDP (constant 2015 US$)  Life expectancy at birth (historical)
82    India      2590898651136            70.7
83    Indonesia  999178567680             70.3
133   Nigeria    492074893312             52.6
```

Problem e.

[ ]:
```
# Load GDP per capita data
total_gdp = pd.read_csv('gdp-per-capita-maddison-2020.csv')

# Only include data from 2018
total_gdp = (total_gdp[total_gdp['Year'] == 2018])

# Merge data for GDP and life expectancy
hi_gdp_lo_le = pd.merge(total_gdp, le)

# Remove irrelevant columns and 'World' entry
hi_gdp_lo_le = hi_gdp_lo_le.drop(columns=['Code', 'Year', '417485-annotations'])
hi_gdp_lo_le = hi_gdp_lo_le[hi_gdp_lo_le.Entity != 'World']

# Calculate mean and standard deviation for GDP
gdp_mean = hi_gdp_lo_le['GDP per capita'].mean()
gdp_std = hi_gdp_lo_le['GDP per capita'].std()

# Filter GDP and life expectancy based on mean and standard deviation
hi_gdp_lo_le = hi_gdp_lo_le[(hi_gdp_lo_le['GDP per capita'] > gdp_mean)]
hi_gdp_lo_le = hi_gdp_lo_le[(hi_gdp_lo_le['Life expectancy at birth␣
 ↪(historical)'] < mean)]
hi_gdp_lo_le = hi_gdp_lo_le.sort_values(by='GDP per capita', ascending=False)

print(hi_gdp_lo_le)
```

	Entity	GDP per capita	Life expectancy at birth (historical)
47	Equatorial Guinea	28528.953	61.2
152	Turkmenistan	26318.365	68.8
77	Kazakhstan	25307.555	71.5