Math 156 Final Project

Code Draft 1

Goal for the project:

1. Decide which parts of our data set to use
2. Code our own linear regression to find a function
3. Try to optimize the function

Ideas

1. Use one year for testing for another year for training

In [20]:

```
# Import the libraries we will be using
import numpy as np
import csv
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb
```

In [38]:

```
# Filter the data
df = pd.read_excel('Data.xls')
columns_to_keep = ['Country name', 'year', 'Log GDP per capita','Social support',
                   'Freedom to make life choices', 'Generosity', 'Perceptions of
df_filtered = df_data_panel.filter(columns_to_keep)
```

In [35]:

```
# Print head
df_filtered.head(5)
```

Out[35]:

	Country name	year	Log GDP per capita	Social support	Healthy life expectancy at birth	Freedom to make life choices	Generosity	Perceptions of corruption	Positive affect
0	Afghanistan	2008	7.302574	0.450662	50.500000	0.718114	0.173169	0.881686	0.414297
1	Afghanistan	2009	7.472446	0.552308	50.799999	0.678896	0.195469	0.850035	0.481421
2	Afghanistan	2010	7.579183	0.539075	51.099998	0.600127	0.125859	0.706766	0.516907
3	Afghanistan	2011	7.552006	0.521104	51.400002	0.495901	0.167723	0.731109	0.479835
4	Afghanistan	2012	7.637953	0.520637	51.700001	0.530935	0.241247	0.775620	0.613513

In [39]:

```
# Print tail
df_filtered.tail(5)
```

Out[39]:

	Country name	year	Log GDP per capita	Social support	Healthy life expectancy at birth	Freedom to make life choices	Generosity	Perceptions of corruption	Positiv affec
2084	Zimbabwe	2017	8.241609	0.754147	52.150002	0.752826	-0.113937	0.751208	0.73364
2085	Zimbabwe	2018	8.274620	0.775388	52.625000	0.762675	-0.084747	0.844209	0.65752
2086	Zimbabwe	2019	8.196998	0.759162	53.099998	0.631908	-0.081540	0.830652	0.65843
2087	Zimbabwe	2020	8.117733	0.717243	53.575001	0.643303	-0.029376	0.788523	0.66065
2088	Zimbabwe	2021	8.153248	0.685151	54.049999	0.667636	-0.109439	0.756945	0.60991

The code belows gives all the information for the year 2020
This could be our training data set

In [41]:

```
df_filtered_2020 = df_filtered[df_filtered.year == 2020]
df_filtered_2020.head(5)
```

Out[41]:

	Country name	year	Log GDP per capita	Social support	Healthy life expectancy at birth	Freedom to make life choices	Generosity	Perceptions of corruption	Positive affect
25	Albania	2020	9.487400	0.710115	69.125000	0.753671	0.006331	0.891359	0.563486
35	Algeria	2020	9.281301	0.867649	66.500000	0.573891	-0.118536	0.724264	0.524169
55	Argentina	2020	9.887899	0.897104	67.150002	0.823392	-0.126743	0.815780	0.679317
85	Australia	2020	10.793239	0.936517	70.974998	0.905283	0.205083	0.491095	0.725689
99	Austria	2020	10.856220	0.924831	71.025002	0.911910	0.008044	0.463830	0.716352

The code belows gives all the information for the year 2021
This could be our testing data set

SOMETHING TO WATCH OUT FOR: Missing countries. We can filter these out

In [43]:

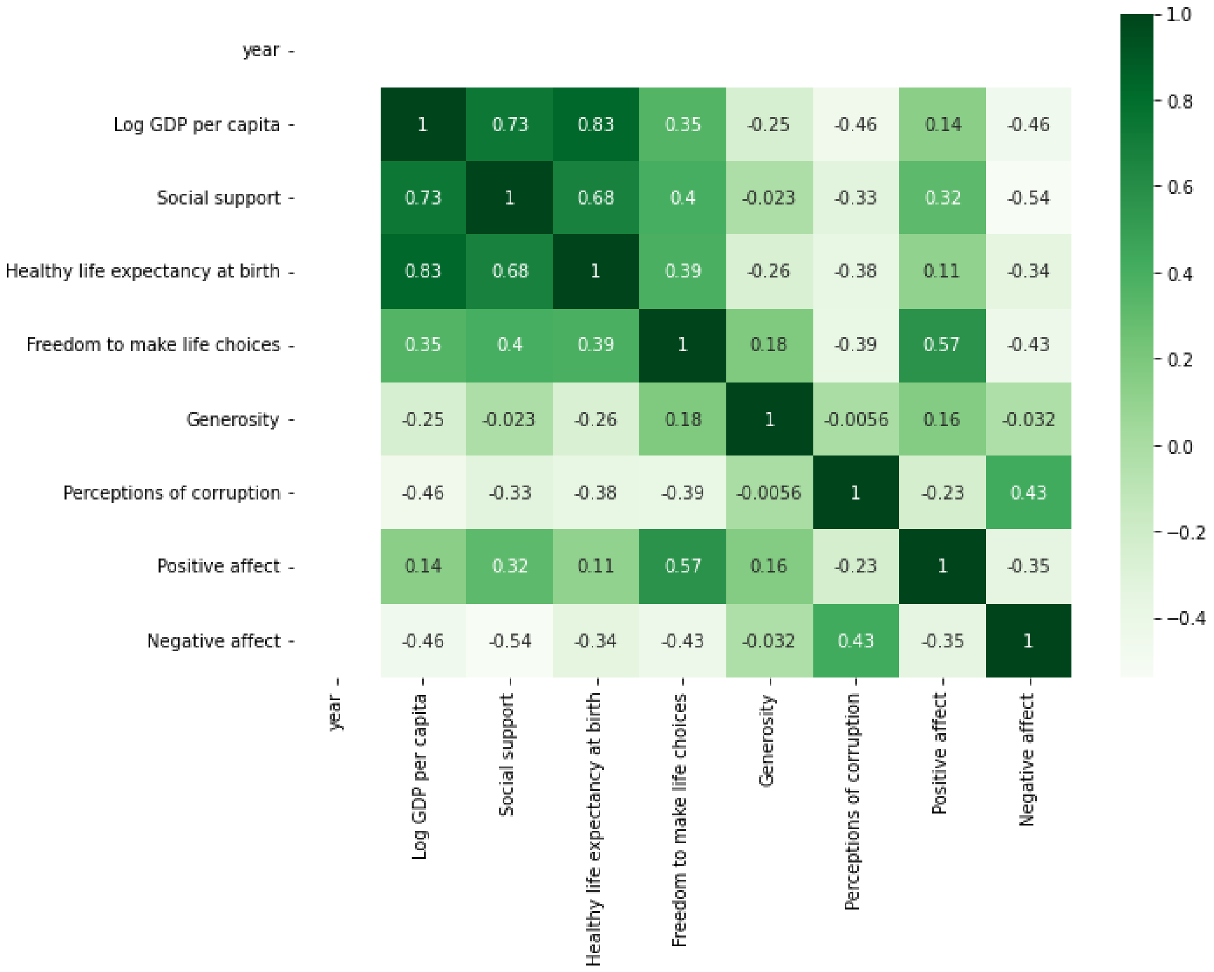
```
df_filtered_2021 = df_filtered[df_filtered.year == 2021]
df_filtered_2021.head(5)
```

Out[43]:

	Country name	year	Log GDP per capita	Social support	Healthy life expectancy at birth	Freedom to make life choices	Generosity	Perceptions of corruption	Positive affect
12	Afghanistan	2021	NaN	0.454175	54.549999	0.394306	NaN	0.946299	0.178886
26	Albania	2021	9.562287	0.701883	69.150002	0.827453	0.044742	0.896127	0.553830
36	Algeria	2021	9.303516	0.840710	66.599998	0.558487	-0.111191	0.711900	0.498022
56	Argentina	2021	9.955421	0.882305	67.199997	0.819479	-0.008816	0.816257	0.684860
71	Armenia	2021	9.500485	0.762044	67.650002	0.795170	-0.150132	0.705334	0.565782

Data exploration using our training data set

In [44]:
```python
# Create the correlation heatmap

plt.figure(figsize=(10, 7))

dataplot = sb.heatmap(df_filtered_2020.corr(), cmap="Greens", annot=True)

plt.show()
```

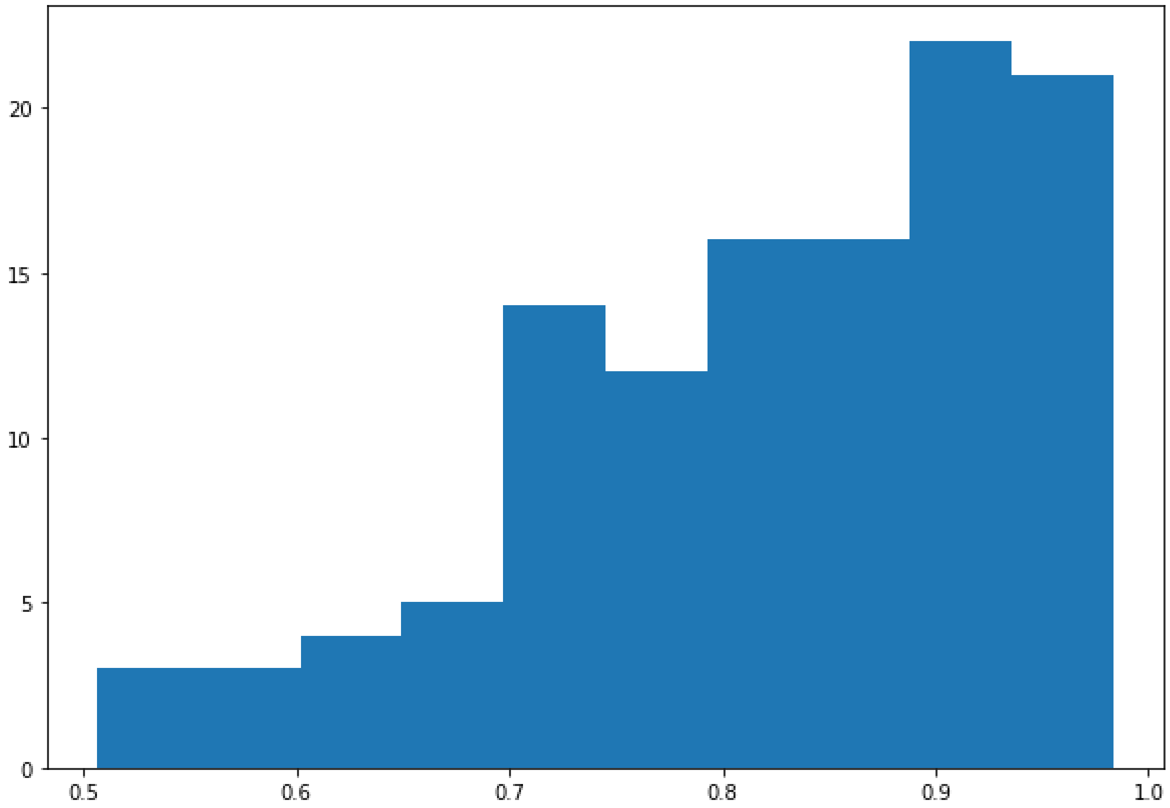


In [45]:
```python
# Analyzing 'Social support' and distribution

print("Social support")
print("mean:", df_filtered_2020["Social support"].mean())
print("median:",df_filtered_2020["Social support"].median())
print("midpoint:",(df_filtered_2020["Social support"].max() + df_filtered_2020["S
print("standard deviation:",df_filtered_2020["Social support"].std())
print()
```

```
Social support
mean: 0.8229818739767732
median: 0.8451225161552429
midpoint: 0.7449610829353333
standard deviation: 0.11187589687104349
```

In [49]:

```
fig, ax = plt.subplots(figsize =(10, 7))
ax.hist(df_filtered_2020["Social support"])

plt.show()
```



Work distribution idea:

- Clean the data (not hard, we just need to remove some missing years)
- Possibly bring in one or two other data sets
- Decide on uni or multivariate regression (multivariate is probably better)
- Type up our own mean squares algorithm (which we can double check using the function)

[Look at the feedback form to add more things to do]