**E/IAS 157AC Spring 2018**

**Assignment: Problem Set #3**

**Due** Friday, March 30, 2018 at 11:59 pm

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**Assignment Description**

In this problem set, you will dive into some publicly available data on climate change, economic growth, and human development in an attempt to understand a little about the complex relationships between these parameters. With each chart you create, be sure to label your axes, create a chart title, and provide a simple regression line (including the R2 value). Note that you don’t need a chart legend if you only have one set of data. Remember – presentation is important! Also remember that a robust analysis would use far more in depth statistics, in particular focusing on each component of your regression model, both the size of the effect of each component as well as the significance, but for the purposes of this problem set linear regression slopes and R2 values will do.

You can download the data from bCourses (ProblemSet3 Data.xlsx).

Note that there are missing data! (welcome to the ‘real world’). If, when doing your calculations, you don’t exclude (i.e. delete) these, you will at times end up plotting a large number of zero-values and skewing your results. Each time you drag a formula through your spreadsheet, you will need to delete the missing points. (For example if you were to try to calculate the “Per-Capita CO2 Emissions from Fossil Fuel Consumption” of Afghanistan, you would get a result of zero because the emissions data is missing. If you plotted this and used it to determine your linear regression, your regression would obviously be meaningless.)

When you explain your graphs, *do not describe them* but instead interpret and explain them. Are there any correlations (or lack of)? Is there anything else that we may learn from the graph?

Finally, the scatter plots you are asked to create are written below using the standard convention of dependent vs. independent (i.e. “plot Y vs. X”).

1) Make a chart of Total GHG Emissions, 2010 vs. GDP

a) Explain your result in 2-3 sentences.

2) Make a chart of Per-Capita Total GHG Emissions, 2010 vs. HDI

a) Explain your result in 2-3 sentences.

3) Make a chart of Cumulative CO2 Emissions from Energy (1850-2007) Rank vs. HDI Rank

a) Explain your result in 2-3 sentences.

4) Make a chart of Cumulative CO2 Emissions from Energy (1850-2007) Per Capita Rank vs. HDI Rank

a) Explain your result in 2-3 sentences.

5) Which country has the highest Total GHG Emissions in 2010? Where do they rank on the per-capita scale? Which country has the highest per-capita?

6) Which country has the highest “Footprint of all goods and services consumed”? Which has the highest per-capita?

7) Go to [www.gapminder.org/tools](http://www.gapminder.org/tools). Create an animated graph that tells you something interesting about climate change (CO2 Emissions should be on one axis). Note you can change an axis by clicking on the axis label and selecting a new measure from the various options. Take a screenshot of one year (be careful – sometimes the most recent data doesn’t include many countries, so take a screenshot that includes most of the world) and include that with your assignment.

a) Explain your result in 2-4 sentences.

8) Reflect on your findings.

a) Do you think per-capita or total national emissions are the more appropriate way to do carbon accounting, and why?

b) Do you think accounting should be based on what a country emits within its boundaries, or what a country consumes, including emissions from the production of goods elsewhere?

c) Do you think countries should reduce their emissions in proportion to i) their past emissions; ii) their level of development & capacity to reduce; iii) the degree to which they will be impacted by climate change; iv) a combination of these, or something else (explain)?