Quantitative Economics with Python
ECON-UA 370
Assignment #1

1. Setup a programming environment on your computers

(a) Install the Anaconda Python Distribution that is available at `https://www.continuum.io/downloads` [An installation Guide is available on the course webpage with more detailed instructions]

(b) Make sure you can open a Jupyter Notebook

(c) Through the terminal (or powershell for windows) run `conda update conda`

(d) Through the terminal (or powershell for windows) run `conda update anaconda`

Programming Questions

Due: 09th February (Beginning of Class)

Answer each of the questions below. Please provide clear explanations for your reasoning and include any code that you write.

2. Explain each of the following Python expressions

a. 2+5
b. 2 + 5
c. 2*5
d. 2/5
e. 2**5
f. 2 // 5

3. What are the **types** of the following variables?

a. `a = 2`
b. `b = 2.0`
c. `c = '2.0'`
d. `d = [2]`
e. `e = [2 , "2" , 2.0]`

4. What is the value of x after running these statements in order? Why?

```
x = 7
x = x + 3
```

5. What is the value of y after running these statements in order? x? Why?

```
x = 3
y = x
x = 10
```

6. Does this code run without error? If so, what does it produce? If not, explain why.

```
x = 3
x = x/2
y = 'abc'
z = y + y
print(x, z)
```

7. Does this code run without error? If so, what does it produce? If not, explain why.

```
x=3
x = x/2
y = 'abc'
z = x + y
print(x, z)
```

8. Explain the result for each statement:

a. `len([1234])`
b. `len("1234")`
c. `len(1234)`
d. `len([1,2,3]+['a','b','c'])`

9. Consider the integer `x = 1234`.

a. Convert x to a floating point number.
b. Convert x to a string.
c. Convert x to the list `['1', '2', '3', '4']`

10. Consider the string `x = "How many characters and words are in this string?"`

a. Use Python to determine how many characters x contains?
b. Convert x to a list of individual characters.
c. Convert x to a list of individual words.
Hint: Use tab completion to find a method that splits x into pieces.
d. Use Python to count the number of occurrences of the letter 'a' that are contained in the variable x.

11. A rectangle has `width = 5` and a `length = 12.5`. A circle has a `radius = 2.5`. Write Python code to evaluate the following expressions:

a. area = width * length
b. area = $\pi * radius^2$

Given the variable `length = 12.5`, explain the results of these python expressions

c. `int(length)`
d. `str(length).split('.')`

12. Write a Python function that returns the volume of a sphere given its radius.
Hint: The volume of a sphere is $\frac{4}{3} * \pi * r^3$