Tutorial MATH 1MP3 – January 12, 2017

The following questions are to be done in groups of two or three.
- Open PyCharm and create a new project (File -> New Project, make sure the drop down box in "interpreter" points to your Anaconda installation!)
- In this project create a new python file (File -> New, then click "Python File" in the menu that appears)
- Write the code for the following questions in that python file. Just have each question answer follow the previous one in the code. (I recommend doing each question one at a time, though)

For the following questions, write a python program (in PyCharm or otherwise) that prints the answer. The first question is answered for you to get you started.

1) Print the area of the rectangle with height 4 and length 6.
   Answer:
   ```
   height = 4
   length = 6
   print(height*length)
   ```
2) Print the area of the triangle with base 6 and height 3.
3) Define `first_name` to be a python variable containing your first name in lower case, let `last_name` be a python variable containing your last name in lower case.
   a) Print your full name with a space inbetween first and last name.
   b) Open up a python console (this can be done in PyCharm by going to Tools->Python Console)
   c) Type `dir("")` in the console – this lists all the functions that can be used on strings (ignore any of the ones with underscores at the beginning for now). For instance "`upper`" converts a string to upper case.
   d) Try typing "`aBcDeF".upper()` into the console to see what you get.
   e) Now type `help("".upper)` into the console. This help menu explains what each function does.
   f) Without editing the variables `first_name` and `last_name`, but rather by using python functions, print your full name with a space inbetween with the first letter of each name capitalised. (Hint: use `dir("")` and the `help` command to find a suitable python function to capitalise each name!)
4) Define a variable called `home_country` with value "Canada" and `birth_country` with value "America". Write a python program that switches tha values of these two variables! Do so **without** just hard-coding " `home_country="America"` `birth_country="Canada"` "
5) Create a list with 5 or more numeric values (you choose) and call it "`vector`" write a python code that will print the mean (average) value of `vector`.
6) Given the list `alpha=["a","b","c","d"]` use appropriate python functions to create a list `beta=["a","b","c","d","d","c","b","a"]`. (Hint, typing `dir([])`, like in question 3 might help find a suitable function!)
7) Download http://beastman.ca/romeo.py This file contains single variable called `act1scene1`. This variable is a string of Act 1 Scene 1 of Romeo and Juliet, without any punctuation. Scroll to the bottom of the file and write a couple lines of python to do the following:
   a) Count the number of times "Romeo" appears in the script (should be 4)

b) Count the number of times "Quarrel" appears in the script, regardless of whether upper-case, lower-case, etc. (should be 5).

c) Print out all the words between the first instance of the word "Romeo" and the second instance of the word "Romeo". (The output should be "Saw you him to day .... give cure as know Enter")

8) Using a for loop,
   a) print all the numbers from 1 to 10
   b) print the sum of all the numbers from 1 to 100
   c) print the result of 8 factorial

9) The Fibonacci numbers are a sequence of numbers you get by starting with 1,1 then adding the two previous numbers in the sequence together.

   I.e. the first step gives you 1+1=2   sequence: 1,1,2
        the second step gives you 1+2=3   sequence: 1,1,2,3
        the third step gives you 2+3=5   sequence: 1,1,2,3,5

   Write a python program where you start with a list
   `fib=[1,1]` and you grow the list to calculate the next 20 Fibonacci numbers.
     (Hint: use the python list command `append` and use negative list-indexing)

   In the end, if done correctly, `fib` should contain
   `[1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711]`

10) Without running the code, try and puzzle out what the output of the following is:
    a)
```
x=10
while x>5:
 print(x)
 x-=1
```

    b)
```
x=['ab','cd']
for i in x:
    x.append(i.upper())
print(x)
```