

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 the 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).
- 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)`