CMPSC 102
Discrete Structures
Fall 2018

Practical 2: Calculating Factorial
7th Sept 2018

All the King's horses and all the King's men,
Could not put my Python code together again. Could you help?!

Summary

In this practical, you will be studying placement of blocks and code structure.
You will receive a check-mark grade for this assignment.

GitHub starter link

https://classroom.github.com/a/2jF5bos9

Some background on factorials

The product of the factorial may be computed by the following equation.

$$n! = \prod_{k=1}^{n} k$$
$$= n * (n-1) * (n-2) \cdots (3) * (2) * (1)$$

A worked-out example of the equation is below.

- Let $n = 6$ and so, $n! = 6! = 6 * 5 * 4 * 3 * 2 * 1 = 720$

- Let $n = 8$ and so, $n! = 8! = 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 = 40320$

What to do for this practical

I wrote a computer program in Python that computes the factorial from a user-entered number. The output of the code is shown in Figure 1.

Without warning, late last night, as I was walking around the house carrying my laptop, the lights went out. I was immediately cast in the dark! As I stumbled around to find my way back to safety, I (unfortunately) tripped over a shoe and dropped my machine. There was a loud crash.

When I picked it up, the machine was fine but I noted that the crash has somehow broken the code. For instance, all the tabs that define code blocks have vanished and there is no way to

```
Enter a number : 10
 The number you entered is the following : 10

Testing the number for Odd or Even polarity ...
 The number << 10 >> is EVEN:

Determing the factorial of the number ...
 Current value of fact_int :   1
 Current value of fact_int :   1
 Current value of fact_int :   2
 Current value of fact_int :   6
 Current value of fact_int :   24
 Current value of fact_int :   120
 Current value of fact_int :   720
 Current value of fact_int :   5040
 Current value of fact_int :   40320
 Current value of fact_int :   362880

 * Factorial for 10 is : 3628800
```

Figure 1: The output of the program before it was *broken*. Oops!

determine the original blocks. Furthermore, all lines of the program are now in alphabetical order, as if having been sorted by some magical process. Quite a rough night!

The program computes the factorial from a user-entered number. Your task is to place the code's lines back in their correct order to create a functioning program. You will also have to determine the placement of any tabs for the definition of blocks of code. You are also to add comments to help others understand the general steps of the code.

General guidelines

Click on the repository link above in red. You will find the broken Python code in the **src/** directory of your repository. You are to reassemble this code, determine where the tabs should be found and then test your work by manually calculating factorial values. Alternatively, you could use Python's built-in functions to test your factorial algorithm. For example, if you wanted to check the factorial of 6 (i.e., 6!), your Python shell commands would look like the following.

```
Python 3.6.5 (default, Apr  1 2018, 05:46:30)
[GCC 7.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import math
>>> print(math.factorial(6))
720
```

Once you are satisfied with the correctness of your work, push the code to GitHub using the

following commands:

- git add -A

- git commit -m ''my completed practical 2''

- git push

Broken code

This is the factorial calculator program after having been put through a sorting process of my terrifying evening with my laptop. The code's logic works, but is out of order and you are only ordering the lines to make a working program. Do not forget to add comments to help others understand the general steps of the code. You have a source file of this code in your practical's repository.

```python
# calculating the factorial
# getting the user-inputted number
# tell user what number they entered
# testing if the number is odd or even
#!/usr/bin/env python3
#AuthorEmail = "obonhamcarter@allegheny.edu"
#Date = "6 Sept 2018"
#OriginalAuthor = "Oliver Bonham-Carter"
#Version = "i"
else:
fact_int = 1
fact_int = fact_int * i
for i in range(1,num_int+1):
if num_int % 2 == 0:
num_int = int(num_str) # convert to int
num_str = input("\n Enter a number : ") # get input
print ("  Current value of fact_int : ",fact_int)
print("  The number <<",num_int,">> is EVEN: ")
print("  The number <<",num_int,">> is ODD: ")
print("  The number you entered is the following :",num_int)
print("\n  * Factorial for",num_int,"is :", fact_int, "\n")
print("\n Determining the factorial of the number ...")
print("\n Testing the number for Odd or Even polarity ...")
```