CMSC 201
Section 40
Spring 2020

Lab #9
Importing modules and using predefined functions

Background

One advantage of Python is that there is a ton of existing code that you can use to perform any number of useful functions. You use this code by importing it into your program using the "import" statement.

In addition to importing code that was written by many professional software developers, you can import code that you have written yourself. You do that by saving the functions that you wrote in Python modules, which you can then import with the import statement. There's no need for you to write the same functions multiple times. Just write a function once; save it in a module; and import it whenever you need it.

In this lab, you will be gaining practice at these two operations. In Part 1, you will import a common library called "math" that implements a number of common mathematical functions. In Part 2, you will import functions that have been written for you by your professor, and using those functions to calculate some important values.

Lab Part 1: Import a standard package and use its functions

Create a directory in your gl.umbc.edu account called "Lab9." Change directories to work in that directory.

Create a file called "lab9_part1.py" in the Lab9 directory. Open that file in emacs.

Import that math library by including the statement

import math

at the top of this program. Documentation on the functions contained in the math library, and the parameters they expect, is available at: https://docs.python.org/3/library/math.html

Now create a main program:

if __name__ == "__main__":

First, use the math.factorial() function in a loop. Calculate and print the factorials of the integers 1 through 10. That is,

```
for 1 in range(10):
   print(math.factorial(i))
```

The next part of your program will use the math module's trigonometric functions. math.sin() calculates the sine of a number. Note that this argument must be in radians, NOT in degrees. To get a good value for the mathematical quantity pi, use the math.pi value. Use the statement

PI = math.pi

Use the math.sin() function to print the sines of 0, PI/2, PI, 3*PI/2, and 2*PI.

Lab Part 2: Import custom programs and use their predefined functions

Make sure that you are in your Lab9 directory on gl.umbc.edu. Type
pwd
and make sure it gives you the proper directory. If not, change directories into your Lab9 directory.

Copy the hail.py function from Professor Arsenault's public directory on gl:

cp /afs/umbc.edu/a/r/arsenaul/pub/hail.py hail.py

The file hail.py will now be in your Lab9 directory. Look at the contents of this file using the cat command:

cat hail.py

You should see that this file contains a function, flight, which implements version of the "flight" function that you wrote last week in Lab 8. It also includes a skeleton main program.

Noe copy the file fib.py in the same way:

cp /afs/umbc.edu/a/r/arsenaul/pub/fib.py fib.py

Use cat to see that it contains a function called fibonacci() and a skeleton main program.

You are going to write a program that will import these files and use the "flight" function and the "fibonacci()" function to do some calculations.

Create a new program called lab9_part2.py.

At the top of the file, include the lines:

```
import hail
import fib
```

This will import the hail.py and fib.py files into your program, and make their function flight available for use in your program.

Now, write a main program that calls these functions to solve a problem. One way you can call an imported function is by including the module name with the function name; that is,

hail.flight() will call the function "flight" that's defined in the module "hail."

Type

if __name__ == “__main__”:

Now, write a for loop that will calculate the values of flight() for each of the first 10 Fibonacci numbers.

for i in range(10):

call fib.fibonacci(i) to calculate the i^{th} Fibonacci number. Then call hail.flight() with that number as its argument.
In the for loop, print out the result using the format

It takes (number) steps to fall to the ground from the height of ().