

Python Programming II

Offensive and Defensive Tool Construction

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Offensive and Defensive Tool Construction

Python Programming II

Objectives

This lab focuses on the following objectives:

* Explain conditional statements.
* Understand recursion and how it influences a stack.
* Use strings, lists and tuples.
* Use dictionaries to index data.
* Read and write files.

Background Reading

Read chapters 6–10 in *How to Think Like a Computer Scientist: Learning with Python*, available at [www.greenteapress.com/thinkpython/thinkCSpy.pdf](http://www.greenteapress.com/thinkpython/thinkCSpy.pdf).

# Important Information

* For *every* lab and home assignment, store all your work in your personal repository in a subdirectory named **mXX**, where XX is the module number. Carefully name the program as described in each problem.
* Your programs are extracted from your repository by a Python script. If there are any errors in the program name, then your instructor will never see your program, and you will receive a mark of zero.
* Push your work to the server often, and ensure that you push the final version of a program by the deadline specified, because the script extracting them can be run at any time after the deadline.

# Problem 1

Write a Python program named **m03p01.py** that prints the first 10 rows of Pascal’s triangle in the shape of a triangle. Define the recursive function pascal(row,col)that calculates each element of the triangle. The output should look like this:

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

1 8 28 56 70 56 28 8 1

1 9 36 84 126 126 84 36 9 1

# Problem 2

Write a Python program named **m03p02.py** that generates a sine wave on the terminal using the ASCII star character.

* Make the amplitude of the sine wave 10 lines, and make one period of the sine wave 60 points (60 characters).
* Draw the zero axis using the dash character.
* Use the dictionary indexed by the amplitude to keep track of which positions on the   
  x-axis should have the star.

The output should look like this:

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# Problem 3

Write a Python program named **m04p04.py** that takes a single parameter, a file name, and displays information about the file using the following format:

File Name: some\_file\_name

File Size: 123

Inode : 2498755

Last Mod : Tue Jan 8 07:00:53 2016

# Problem 4

Write a Python program named **m03p04.py** that dumps the ELF file header and identifies its parameters (ELF file headers are described at [https://en.wikipedia.org/wiki/  
Executable\_and\_Linkable\_Format](https://en.wikipedia.org/wiki/Executable_and_Linkable_Format)). Print the parameters using the following format:

File : a.out

Magic : 0x464c457f

Format : 64-bit

Endian : big

Machine: x86-64

# Problem 5

Write a Python program named **m03p05.py** that takes a single parameter, a file name, and prints a hexadecimal dump of it using the following format:

[00000000]: 23 69 6e 63 6c 75 64 65 20 3c 73 74 64 69 6f 2e #include <stdio.

[00000010]: 68 3e 0a 0a 76 6f 69 64 0a 6d 61 69 6e 28 29 0a h>..void.main().

[00000020]: 7b 0a 20 20 70 72 69 6e 74 66 20 28 22 48 65 6c {. printf ("Hel

[00000030]: 6c 6f 20 57 6f 72 6c 64 21 5c 6e 22 29 3b 0a 7d lo World!\n");.}

[00000040]: 0a

Total length 65 (41h)

**Note:** The rest of the problems for this module are available in the homework assignment. See your course schedule for details.