Python Programming II

Objectives

- Explain conditional statements
- Recursion and how it influences stack
- Use Strings, Lists and Tuples
- Use Dictionaries to index data
- Read/write files

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1.

Background Reading

Textbook:
How to Think Like a Computer Scientist
Download under the GNU Free Documentation License using following link:
www.greenteapress.com/thinkpython/thinkCSpy.pdf

Read chapters 6 to 11.

Notes common to all lab and home assignment problems

For every lab and home assignment, all work should go into your personal repository, subdirectory named mXX, where XX stands for the module number. For each problem, carefully name the program as described. The programs are extracted from your repository by a Python script, and errors in the program name will result in the instructor never seeing your program, and your mark for it will be ZERO!

There are always many ways how to solve a programming problem, and usually one or two ways which are fast, compact and elegant. E.g., Problem 3 can be solved in 5 lines of code.

Make sure to push your work to the server often, and have pushed the working version of the program by the deadline specified. The script extracting your programs from your repository will be run at any time after the deadline.
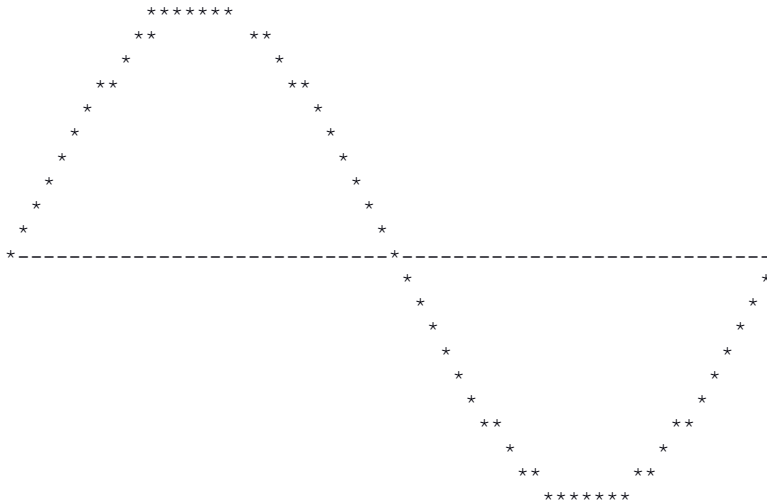
Problem 1

Write Python program `m03p01.py` which will print first 10 rows of Pascal's triangle, making it look like a triangle. Define recursive function `pascal(row,col)`.which will calculate 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 Python program **m03p02.py** to generate pretty sine wave on the terminal using ascii star character. The amplitude of the sinewave shall be 10 lines, and one period of the sinewave shall be 60 points (60 characters). Draw the zero axis using the dash character. Use dictionary indexed by the amplitude to keep track of which positions on the x axis should have the star:

```
                 *******
              **          **
            *                *
          **                   **
         *                       *
        *                         *
       *                           *
      *                             *
     *                               *
    *                                 *
 *                                       *
*----------------------------*----------------------------
                             *                           *
                              *                         *
                               *                       *
                                *                     *
                                 *                   *
                                  *                 *
                                   **             **
                                     *           *
                                      **       **
                                        *******
```

Problem 3

Write Python program **m03p03.py** which will take one parameter, a file name, and display information about the file:

```
File Name: some_file_name
File Size: 123
Inode    : 2498755
Last Mod : Tue Jan  8 07:00:53 2016
```

Problem 4

Write Python program **m03p04.py** which will dump ELF file header and identify its parameters (the ELF file header is described here: https://en.wikipedia.org/wiki/Executable_and_Linkable_Format). Print parameters according to this example:

```
File   : a.out
Magic  : 0x464c457f
Format : 64-bit
Endian : big
```

```
Machine: x86-64
```

Problem 5

Write Python program **m03p05.py** which will take single parameter – a file name – and print hexadecimal dump of it following this example:

```
[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)
```

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