MAHIDOL UNIVERSITY

Wisdom of the Land

[SCPY204]

Computer Programing

for Physicists

Class 05: 16 Feb 2017

Content: Introduction to object-oriented programming, File I/O

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2017

“Happy V-Day”

Today's Goals

Part I: Review, Q&A
Part II: File I/O
Part III: Exercise
Part IV: Introduction to Python modules
(mainly NumPy and Matplotlib)
Part V: Some introduction idea of OOP

Review: Recursion

Recursion = self calling function
= to do recursive task(s)
= can be very useful in many cases.

Think recursive!
I recommend to follow these steps when writing a recursive function.

1. **Ask yourself**: do you really need a recursive function? Do you know you problem well?
2. There must be the "**IF**"
   - to separate at least 2 cases:
   Recursive case: where the function will call itself.
   Base case: where no reclusive calling needed or to stop.
3. Handle base case
   - No looping in base case
4. Handle recursive
   - Dealing with **next** input/statement (to a function)
5. Know your the recursive call
   - **Ask yourself**: It does the job?

Review: Recursion

Take a deep breath and try these exercises [30 - 60 min]

Exercise 1: Can you do the Fibonacci and Factorial using recursion?
Exercise 2: Can you do the summation of odd number from 1 – 99 using recursion?
Exercise 3: This 2-D array (list) contains 1 and 2. I want to change the group of 1 in the center to 3. Write a program to do that using recursion. You may also try using while loop also.

arr = [
1 1 1 2 2 2 2 2 2 2,
1 1 2 2 2 1 1 1 2 2,
1 2 2 1 1 1 1 1 2 2,
2 2 2 2 2 1 1 2 2 2,
2 2 2 2 2 2 2 2 2 2,
2 2 2 2 2 1 2 2 2 2]

Exercise 4: vec = [2,4,2,8,1,4,9,3,1,4,9,5,5]. Sort this array using recursion (your may also try while loop also). Use simple bubble sort

File I/O: Python

Try reading this tutorial:
1. http://www.python-course.eu/python3_file_management.php
2. http://www.python-course.eu/python3_formatted_output.php

Exercise 1: Try creating a simple file containing numbers in each line. Read those number into a list.

Exercise 2: Score of 100 students is prepared in the course website. Try reading it into a list and do the following tasks.
a) Find max, min, mean, median, mode and SD.
b) Make a histogram inside a terminal!
c) Write a file with grade after score in each line.

Python: Modules

Try reading the manual from http://matplotlib.org/

Exercise 1: Making a sine curve from 0 to 4π.

Exercise 2: Plot a histogram of a previous exercise.