

Week 1 Exercises

Physics 91SI Spring 2011 Handout 06

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Python Interpreter

In class, we talked about how to run python scripts from a UNIX-like environment. Now, we'd like you to try running something called the "Python Interpreter".

Log in to `corn` and type `python` into the command line. You should see Python version 2.6.6, a prompt with `>>>`, and a blinking cursor. This is called the python interpreter. You can type python commands into the interpreter and they will run in Python. This is a nice way to do quick checks when programming in Python. We'll talk later about "compiled" vs "interpreted" languages.

Try importing `numpy` and calculating pythagorean theorems in the interpreter, then exit the interpreter with `Ctrl-D`.

Hailstone Sequence

This assignment was adapted from CS106A Assignment 2, so many of you have seen this in Java. We'll now do it in Python.

Here's the description of the hailstone sequence:

```
Pick some positive integer and call it n.  
If n is even, divide it by two.  
If n is odd, multiply it by three and add one.  
Continue this process until n is equal to one.
```

Write a python script `hailstone.py` that takes an argument `n` from the command line and prints the hailstone sequence for that integer. In other words, print `n`, then follow the rules above, printing `n` until you get to 1. For example, the hailstone sequence for 5 is: 5, 16, 8, 4, 2, 1

Start by writing some pseudocode, then use the information at <http://docs.python.org/tutorial/controlflow.html> to write the rest.

Last Names

Suppose we have a list of names that is stored in a text file, and we want to figure out how many people share last names. To do this, we will figure out how many people in this file have each last name in general.

Copy the files `filereading.py` and `names.txt` from:
`/afs/ir.stanford.edu/class/physics91SI/src/exercise1/` into your directory.

Write a python script `lastnames.py` that reads in the file into a python list. The names in this file are all formatted as “firstname lastname” with a space in the middle. (You can open the file with `less`, `head`, `cat`, or a text editor to check.) Iterate through this list and create a new list of just last names. Go through this list of last names and figure out how many people have each last name. (Hint: you may want to sort the list, and there’s an easy way to do that.)

There are easier and more efficient ways to do this, but we’re asking you to do it specifically this way to give you some practice with strings and lists. We’ll talk in a few weeks about other ways to do this.

You will find the following links helpful:
<http://docs.python.org/tutorial/inputoutput.html#reading-and-writing-files>
<http://docs.python.org/library/stdtypes.html#string-methods>
<http://docs.python.org/tutorial/introduction.html#lists>
<http://docs.python.org/tutorial/controlflow.html#for-statements>
<http://docs.python.org/tutorial/datastructures.html>

Sums of Primes

Write a python script `sumprimes.py` that computes the sum of all prime numbers below 5000. (Hint: write a function `is_prime` that returns `True` or `False`. Note that these are capitalized in python.)

Submitting Your Code

Just for this week, you don’t have to submit your code at the end of our problem set session. We’ll show you how to do it next week in lecture.