Outline for October 31, 2012

Reading: None

Assignment due: Friday, November 9, 2012 at 5:00 PM

1. How to solve problem #2 of Homework #2
2. Recursion
   a. $n$ factorial [nfact.py]
   b. Fibonacci numbers [rfib.py]
   c. Sum of digits [sumdigits.py]
3. Speed: compare iterative and recursive Fibonacci programs [timefibs.py]

Problem #2, Homework #2
Write a function $gcd(m, n)$ that calculates the greatest common divisor of $m$ and $n$. The greatest divisor of $m$ and $n$ is the largest positive integer $k$ that evenly divides $m$ and $n$ (that is, divides both of them giving a remainder of 0). Use Euclid’s algorithm to calculate this. Here is one very succinct way to describe the algorithm (as usual in Python, $m \% n$ is the remainder of $m$ when divided by $n$):

Repeatedly replace $m$ with $n$, and $n$ with $m \% n$, until $n$ is 0

When $n$ is 0, the value $m$ is the greatest common divisor of $m$ and $n$. Then write a program that calls your function repeatedly, until the user enters 0 for $n$. Here is an example run of such a program. What the user types is in italics and the symbol “ˆ” means to type a return or enter. Please do not try to make the input in italics and show the return symbol in your output, of course!

First number (0 to stop): 113
Second number: 293
The greatest common divisor of 293 and 113 is 1
First number (0 to stop): 14
Second number: 18
The greatest common divisor of 18 and 14 is 2
First number (0 to stop): -30
Second number: -66
The greatest common divisor of -66 and -30 is 6
First number (0 to stop): 7
Second number: 0
The greatest common divisor of 0 and 7 is 7
First number (0 to stop): 0

Please call your program “gcd.py”.

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