

HW 11

This assignment is due November 25th at 9AM.

These problems require very little coding, but lots of thinking. The problems are in pairs -- first doing them in "traditional style" and then doing them in functional programming style.

(1) A reversi number is a number that reads the same forwards and backwards, such as 303. The largest reversi number that is a product of two 2-digit numbers is $9009 = 91 \times 99$.

Write a Python program to find the largest reversi number that is a product of two 3-digit numbers.

Your output format should be "abc x def = ghiihg" (where the letters are replaced by digits).

(2) Convert script (1) so that it uses functional programming (e.g., list comprehension, map, reduce, and/or lambda), and has no if/while/for statements or recursion.

(3) Consider a triangle of numbers. By starting at the top of the triangle and moving to adjacent numbers below, we want to find the maximum total from top to bottom.

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    2
   6 3
  1 3 5
 7 4 8 2
```

In the triangle above, the maximum value is found by the sequence $2 + 6 + 3 + 8 = 19$

Consider the triangle with a hundred rows in the file <http://people.ischool.berkeley.edu/~tygar/for.i206/maxtriangle.txt>

Find the path from top to bottom with maximum value. (Note that you will need to think of a good algorithm here -- if you try searching all possible paths, it will take in excess of 5 billion years.)

Your output format should list the chain, starting from the top and going to the bottom, as a sum. For the small example above, the output would be

"2 + 6 + 3 + 8 = 19"

(4) (Extra credit) Convert script (3) so that it uses functional programming (e.g., list comprehension, map, reduce, and/or lambda). Try to use as few if/while/for statements as possible (it is possible to do the problem with no if/while/for statements). Do not use recursion.

Create python scripts solving these problems and put them in

hw11.1.<lastname>.py,
hw11.2.<lastname>.py,
hw11.3.<lastname>.py, and
(if applicable) hw11.4.<lastname>.py.

Describe your algorithm for part (3) in

hw11.alg.<lastname>.txt.

Upload the files in the usual way.