6.189 IAP 2011: Optional Recursion Exercises

These exercises are optional, have fun playing around with them. Solutions will be posted to the website on Tuesday; feel free to ask questions about these problems on the staff email list, or at office hours.

For all these problems, be sure to carefully consider your *base* and *recursive* cases carefully!

1. Write a function that takes in two numbers and recursively multiplies them together.
2. Write a function that takes in a `base` and an `exp` and recursively computes $\texttt{base}^{\texttt{exp}}$. You are *not allowed* to use the `**` operator!
3. Write a function using recursion to print numbers from n to 0.
4. Write a function using recursion to print numbers from 0 to n (you just need to change one line in the program of problem 1).
5. Write a function using recursion that takes in a string and returns a reversed copy of the string. The only string operation you are allowed to use is string concatenation.
6. Write a function using recursion to check if a number n is prime (you have to check whether n is divisible by any number below n).
7. Write a recursive function that takes in one argument n and computes F_n, the n^{th} value of the Fibonacci sequence. Recall that the Fibonacci sequence is defined by the relation

   $$F_n = F_{n-1} + F_{n-2}$$

   where

   $$F_0 = 0 \quad \text{and} \quad F_1 = 1$$

   Visit the Wikipedia page on the Fibonacci Number for more information if you're still confused.