CS 312: Algorithm Analysis

Homework Assignment #1

Show all work neatly.

1) (6 points) Do 0.1 (a-f, m) from the text

2) (2 points Extra Credit) You get extra credit if you can do 0.2 from the text. At least give it a good try. Hint: If c $\neq$ 1, the "closed form" formula for a geometric series is

$$g(n) = \frac{1 - c^{n+1}}{1 - c} = \frac{c^{n+1} - 1}{c - 1}$$

3) (4 points) The Fabonacci series (named after the lesser know cousin of Fibonacci) is

$f(n) = f(n\text{-}1) + f(n\text{-}2) * f(n\text{-}3)$ for integer $n > 2$ with $f(0) = f(1) = f(2) = 1$

Assume adds and multiplies are O(1), i.e. they are not arbitrarily long integers.

a) Show in psuedocode an exponential time algorithm to solve this for an arbitrary integer n. As a function of n give a rough big O complexity class for the algorithm and justify your answer.

b) Show in psuedocode a linear time algorithm to solve this for an arbitrary integer n. As a function of n give the exact number of adds and multiplies necessary for your algorithm to calculate $f(n)$.