CS325 Winter 2013: HW 1

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0.2 from text book

Show that, if c is a positive real number, then $g(n) = 1 + c + c^2 + \cdots + c^n$ is:

1. $\Theta(1)$ if $c < 1$

2. $\Theta(n)$ if $c = 1$

3. $\Theta(c^n)$ if $c > 1$

The moral: in big-Θ terms, the sum of a geometric series is simply the first term if the series is strictly decreasing, the last term if the series is strictly increasing, or the number of terms if the series is unchanging.

0.3(a) from text book

The Fibonacci numbers $F_0, F_1, F_2, \ldots$, are defined by the rule

$$F_0 = 0, F_1 = 1, F_n = F_{n-1} + F_{n-2}.$$

In this problem we will confirm that this sequence grows exponentially fast and obtain some bounds on its growth.

1. Use induction to prove that $F_n \geq 2^{0.5n}$ for $n \geq 6$.

2.3 from text book

2.4 from text book

2.17 from text book