

Homework 4

Due 09/10/15

September 3, 2015

1. Use the *formal definition* of Big-Oh to prove that if $f(n) = O(g(n))$, then $f(n) + g(n) = O(g(n))$.
2. Prove that if $f(n)$ is a polynomial of the form $\sum_{i=1}^d a_i n^{x_i}$, for some coefficients a_1, a_2, \dots, a_d and exponents x_1, x_2, \dots, x_d , then $f(n) = \Theta(n^{\max\{x_1, x_2, \dots, x_d\}})$.
Hint: you may use any property of Big-Oh notation listed in the slides.
You may wish to use induction for this problem.
3. (*Bonus*) Prove that $2^n = \Omega(n^k)$ for all integers $k \geq 1$.