CMPT-225 Jan Manuch

Recommended Labs – Monday, June 19, 2006

The goal of this lab is to get you familiar with big O notation.

a) Prove the third rule of big O notation arithmetic (by using definition of big O notation). That is prove that if $f_1(n)$ is of order $O(g_1(n))$ and $f_2(n)$ is of order $O(g_2(n))$ then $f_1(n)*f_2(n)$ is of order $O(g_1(n)*g_2(n))$.

b) On the lecture we said that the constants can be ignored. However, not all constant can be ignored. By the first rule that f(n) and c*f(n) have the same order, i.e., the multiplicative constant in the front of the function can be ignored. Is it true that

   1) n^c and n^d have the same order (when c<d are constants greater than 0)?
   2) c^n and d^n have the same order (when c<d are constants greater than 1)?
   3) 2^{cn} and 2^{dn} have the same order (when c<d are constants greater than 0)?

   Either prove that they have the same order (using the definition of big O notation), or show that the function with d is not of order of the function with c. (Of course, it is always true that the function with c (remember c<d) is of order of the function with d.)