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CompSci 102 Discrete Mathematics for CS  
Spring 2005 Forbes In-class Questions 1

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1. Given:  $T_1(n) \in O(f(n))$  and  $T_2(n) \in O(f(n))$ , state which of the following statements are true or false and give a justification.

(a)  $T_1(n) + T_2(n) \in O(F(n))$

(b)  $T_1(n) - T_2(n) \in O(F(n))$

(c)  $T_1(n)/T_2(n) \in O(1)$

(d)  $T_1(n) \in O(T_2(n))$

2. Order the following functions by growth rate. Indicate which functions grow at the same rate.

$n, \sqrt{n}, n^{1.5}, n^2, n \log n, n!, n \log \log n, n \log^2 n, n \log(n^2), 2/n, 2^n, 2^{n/2}, 37, n^3, n^n, n^2 \log n$

3. An algorithm takes 0.5ms for input size 100. How long will it take for input size 500 if the running time is the following? What assumptions do you have to make in order to answer this problem?

(a)  $O(n)$

(b)  $O(n \log n)$

(c)  $O(n^2)$

(d)  $O(n^3)$