

Assignment 1

CS 350

Due: October 9, 2019

Your solutions must be typed (preferably typeset in L^AT_EX) and submitted as a hard-copy at the beginning of class on the day its due.

Problem 1: [10 points] List the functions below from lowest order of growth to highest. If any two or more are the same, indicate which.

\sqrt{n}	m	2^n
$n \log n$	$n - n^3 + 7n^5$	$k^2 + \log k$
m^2	n^3	$\log n$
$n^{\frac{1}{3}} + \log n$	$(\log n)^2$	$n!$
$\ln m$	$\frac{n}{\log n}$	$\log \log k$
$(\frac{1}{3})^n$	$(\frac{3}{2})^n$	6

Problem 2: [10 points] Suppose that $f(n)$ and $g(n)$ are non-negative functions. Prove or disprove the following: if $f(n) \in O(g(n))$ then $2^{f(n)} \in O(2^{g(n)})$.

Problem 3: [10 points] Prove that for any *positive* integer constants a and b .

$$(n + a)^b \in \Theta(n^b)$$

You will need to show that $(n + a)^b \in \Omega(n^b)$ and that $(n + a)^b \in O(n^b)$. (Warning: do not trust the internet's answer for this question.)