

CSCI 241: HOMEWORK 6

Each question is worth 25 points. The assignment is due on Mar 6 in class. Show your work.

1. Let $f(x) = \sin(x) + 5$ and $g(x) = \cos(x) + 10$. Is it true that $f(x) = O(g(x))$? Is $g(x) = O(f(x))$?
2. Let $f(x) = 1/x$ and $g(x) = 1/x^2$. What is the relationship between f and g , i.e., which one is big-O of the other? Also, show that $f(x) = O(1)$.
3. Assume that $f(x) = O(h(x))$ and $j(x) = O(g(x))$. Prove or disprove the following:
 - (a) $f(x)/g(x) = O(h(x)/j(x))$
 - (b) $f(x)/j(x) = O(h(x)/g(x))$
4. Show that $n!$ is not $O(2^n)$, show, in fact, that it is not $O(a^n)$ for any constant a .