Name _____

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CSCI 332, Fall 2025
Quiz 2

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1. (6 points) Suppose you have algorithms with the following runtimes. (Assume these are exact running times as a function of the input size n, not asymptotic running times.) How much slower do these algorithms get when you double the input size? (You can find this by dividing the runtime on $2n$ by the runtime on n). You should simplify your answer as much as possible, including evaluating logarithms when possible.

   (a) $3n^2$

   (b) $\log_2 n$

   (c) 2^n

2. (4 points) Simplify the following Big-O notations so that $f(n) = O\big(g(n)\big)$. The function $g(n)$ should be both as simple and as tight as possible. For example, if $f(n) = 3n^2 + 5n + 2$, then the answer should be $O(n^2)$, even though $O(n^3)$ is also correct but not as tight, and $O(n^2 + 2)$ is also correct but not fully simplified.

   (a) $f(n) = \log(7 \cdot n^{3n})$. What is $g(n)$?