

Due: Wed, Sept 16, in class

Your Name: _____

Assigned reading for this lecture:

- Kleinberg Tardos Section 2.2

Review the handout on Big Oh and logarithms as well as Section 2.2 in the textbook.

Please answer the following questions. Remember that daily exercises are to be done on your own. Nonetheless, the TAs and instructor are great resources if you get stuck, especially for helping to go over the fundamentals of each topic.

For each question below, there are two functions $f(n)$ and $g(n)$. Indicate which is true: $f(n) = O(g(n))$, or $g(n) = O(f(n))$, or both. Assume all logarithms are base 2. The first part is a solved example.

Question 1: Let's say $f(n) = 10 \log n$, and $g(n) = n$. Circle one:

- a) $10 \log n = O(n)$ b) $n = O(10 \log n)$
- c) Both $10 \log n = O(n)$ and $n = O(10 \log n)$

Question 2: Let's say $f(n) = \log n$, and $g(n) = \log \sqrt{n}$. Circle one:

- a) $\log n = O(\log \sqrt{n})$ b) $\log \sqrt{n} = O(\log n)$
c) Both $\log n = O(\log \sqrt{n})$ and $\log \sqrt{n} = O(\log n)$

Question 3: Let's say $f(n) = 2^n$, and $g(n) = 5^n$. Circle one:

- a) $2^n = O(5^n)$ b) $5^n = O(2^n)$
c) Both $2^n = O(5^n)$ and $5^n = O(2^n)$

Question 4: Let's say $f(n) = n \log n$, and $g(n) = 2^{\log n}$. Circle one:

- a) $n \log n = O(2^{\log n})$ b) $2^{\log n} = O(n \log n)$
c) Both $n \log n = O(2^{\log n})$ and $2^{\log n} = O(n \log n)$

Hint: Simplify $2^{\log n}$.