1. What is wrong with this Big Oh proof?

$$f(n) = 7n^5 - 3n^4 + 2$$
$$\leq 7n^5 - 3n^5 + 2n^5 = 6n^5$$

for $n \geq 1$ and therefore, $f(n)$ is in $O(n^5)$.

2. Prove that $f(n)$ is in $O(n^5)$.

# General Technique for bounding a sum:

Assume $a_i$ , $b_i$, and $c_i \geq 0$ for i= 1, 2, 3, … , n.

$$A = \sum_{i=1}^{n} a_i$$

$$B = \sum_{i=1}^{n} b_i$$

$$C = \sum_{i=1}^{n} c_i$$

If $a_i \leq b_i \leq c_i$ for i= 1, 2, 3, … n

then $A \leq B \leq C$ .

That is, *A* is a lower bound for B

and *C* is an upper bound for B

1. What is wrong with this Big Oh proof?

$$f(n) = 7n^5 - 3n^4 + 2$$
$$\leq 7n^5 - 3n^5 + 2n^5 = 6n^5$$

For $n \geq 1$,

$7n^5 \leq 7n^5$

$2 \leq 2n^5$

BUT: $-3n^4 > -3n^5$

$$f(n) = 7n^5 - 3n^4 + 2$$
$$\le 7n^5 + 0 + 2n^5 = 9n^5 \text{ for } n \ge 1.$$

$$7n^5 \le 7n^5$$

$$-3n^4 \le 0$$

$$2 \le 2n^5$$

Some students used a smaller constant than what you get by summing the positive coefficients. This greatly complicates the process for finding $n_0$.

Some students used $3n^4$ instead of 0 here which is OK but note that 0 works just as well.

If you do better on the final exam than on the midterm, I will replace your midterm score with your final exam score.

The midterm is graded out of 80.

Final exam tutorial: Sat. Dec. 2 at 1pm, in Elliott 168.

Assignment #3 is due on Monday Oct. 30.
You already know everything you need to do the assignment.

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