

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Mathematics for Computer Science
MIT 6.042J/18.062J

Asymptotic Blunders



Albert R Meyer,

April 10, 2013

Ohblunder.1

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Big Oh Mistakes

" $\cdot = O(\cdot)$ " defines a relation

Don't write $O(g) = f$.

Otherwise: $x = O(x)$, so $O(x) = x$.

But $2x = O(x)$, so

$$2x = O(x) = x,$$

therefore $2x = x$.

Nonsense!



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Ohblunder.2

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Big Oh Mistakes

Lower bound blunder:
"f is at least $O(n^2)$ "

should say

$$n^2 = O(f)$$



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Ohblunder.3

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Big Oh Mistakes

False Lemma: $\sum_{i=1}^n i = O(n)$

Of course really:

$$\sum_{i=1}^n i = \Theta(n^2)$$



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Ohblunder.4

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Big Oh Mistakes

False Lemma: $\sum_{i=1}^n i = O(n)$

false proof:

$0 = O(1), 1 = O(1), 2 = O(1), \dots$

So each $i = O(1)$. So

$$\begin{aligned}\sum_{i=1}^n i &= O(1) + O(1) + \dots + O(1) \\ &= n \cdot O(1) = O(n).\end{aligned}$$

