O_2

You'll need access to a laptop.

From last time

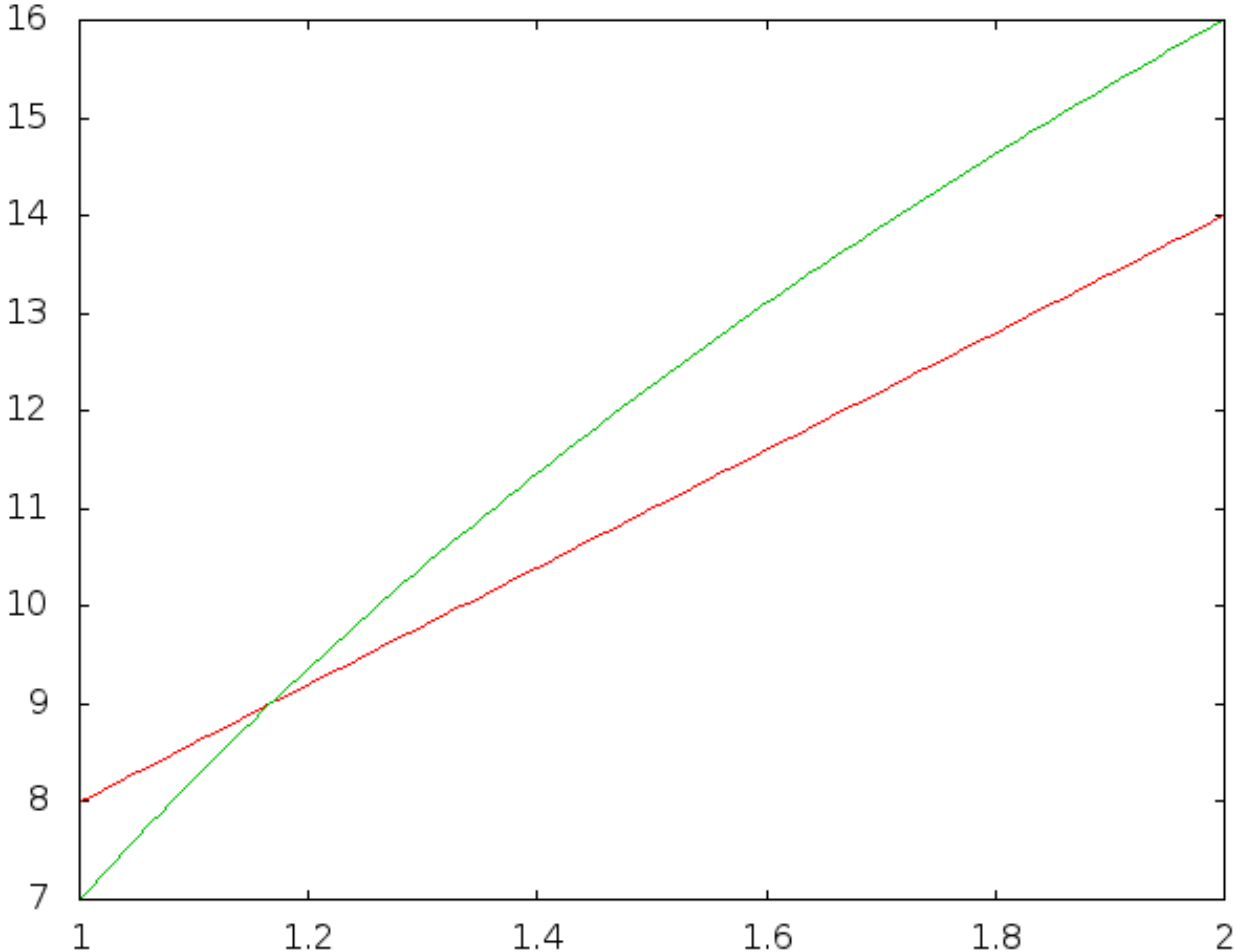
Operation Counting *Constants* *Big-O (loosely)*

Today

Big-O (Precisely!)

So: you want to analyze an algorithm...

Let $T(n)$ *denote the running time of your algorithm on an input of size* n.



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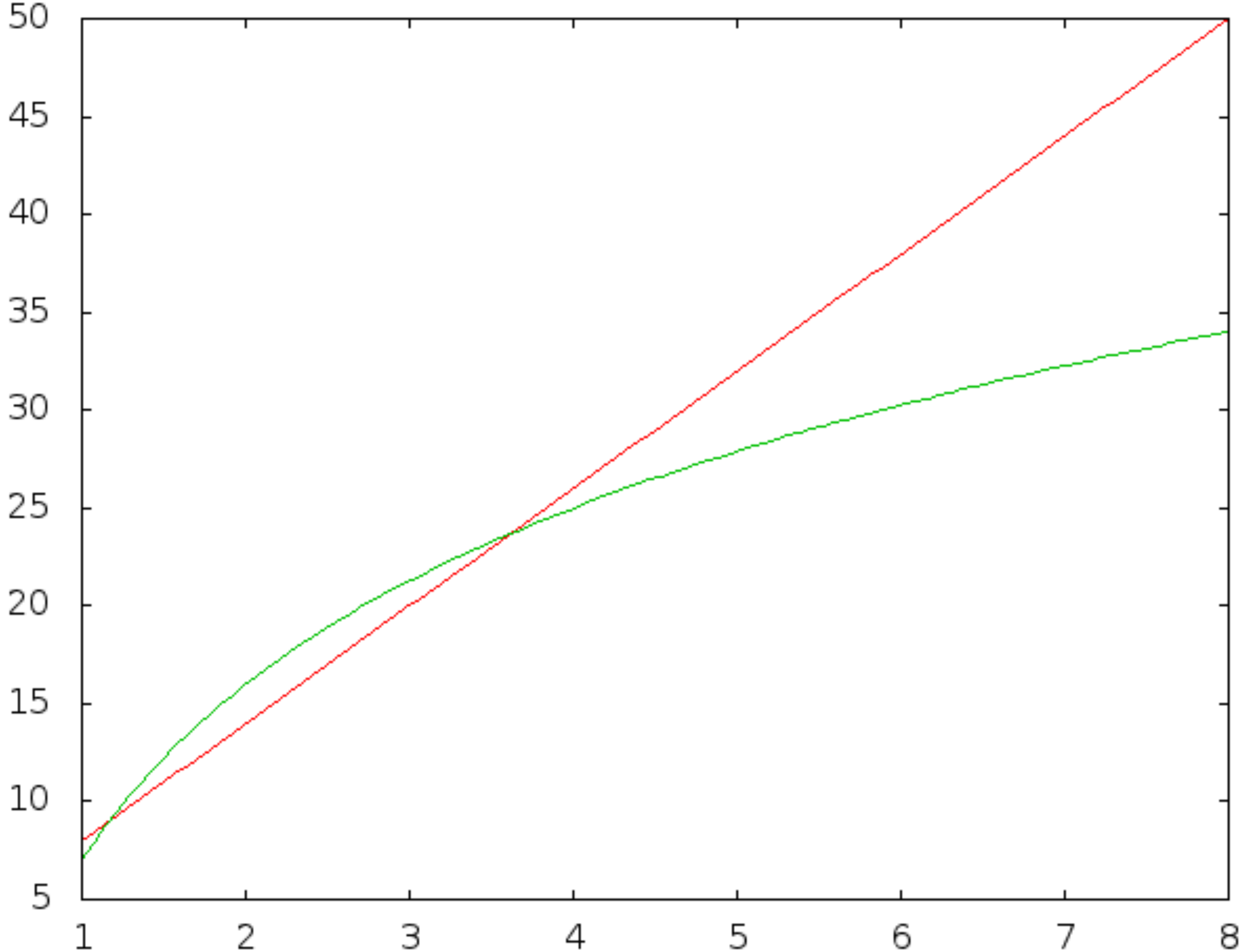
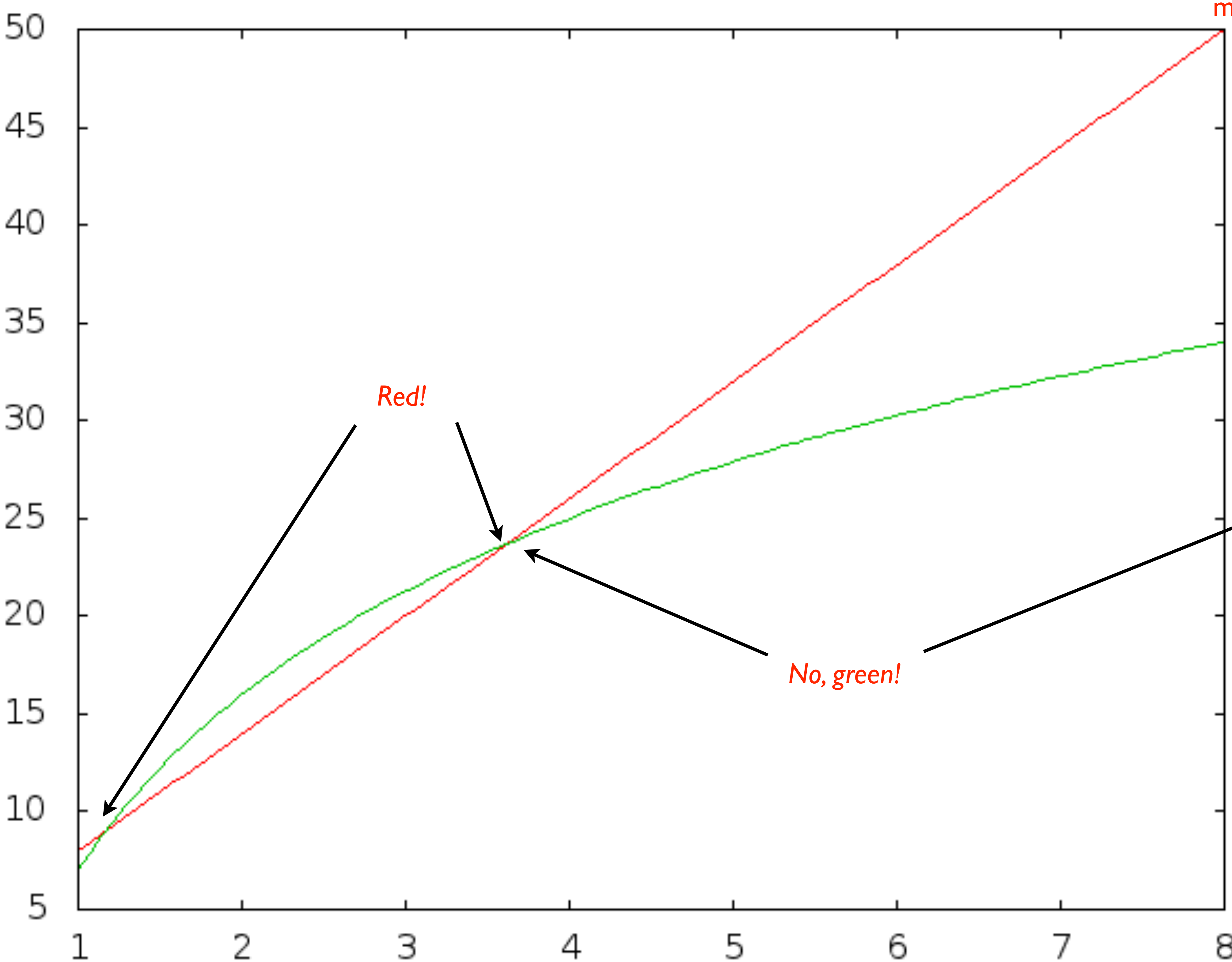
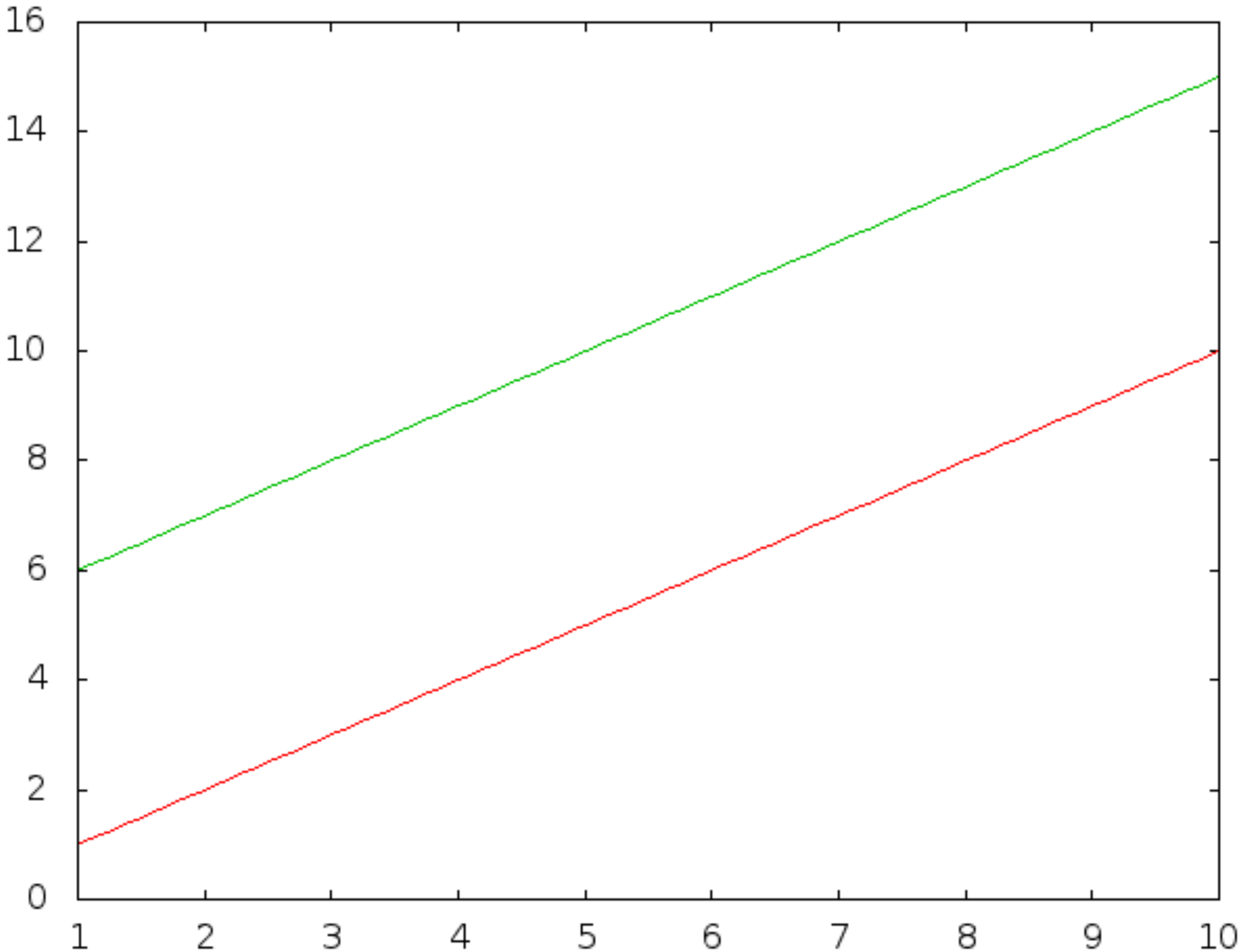


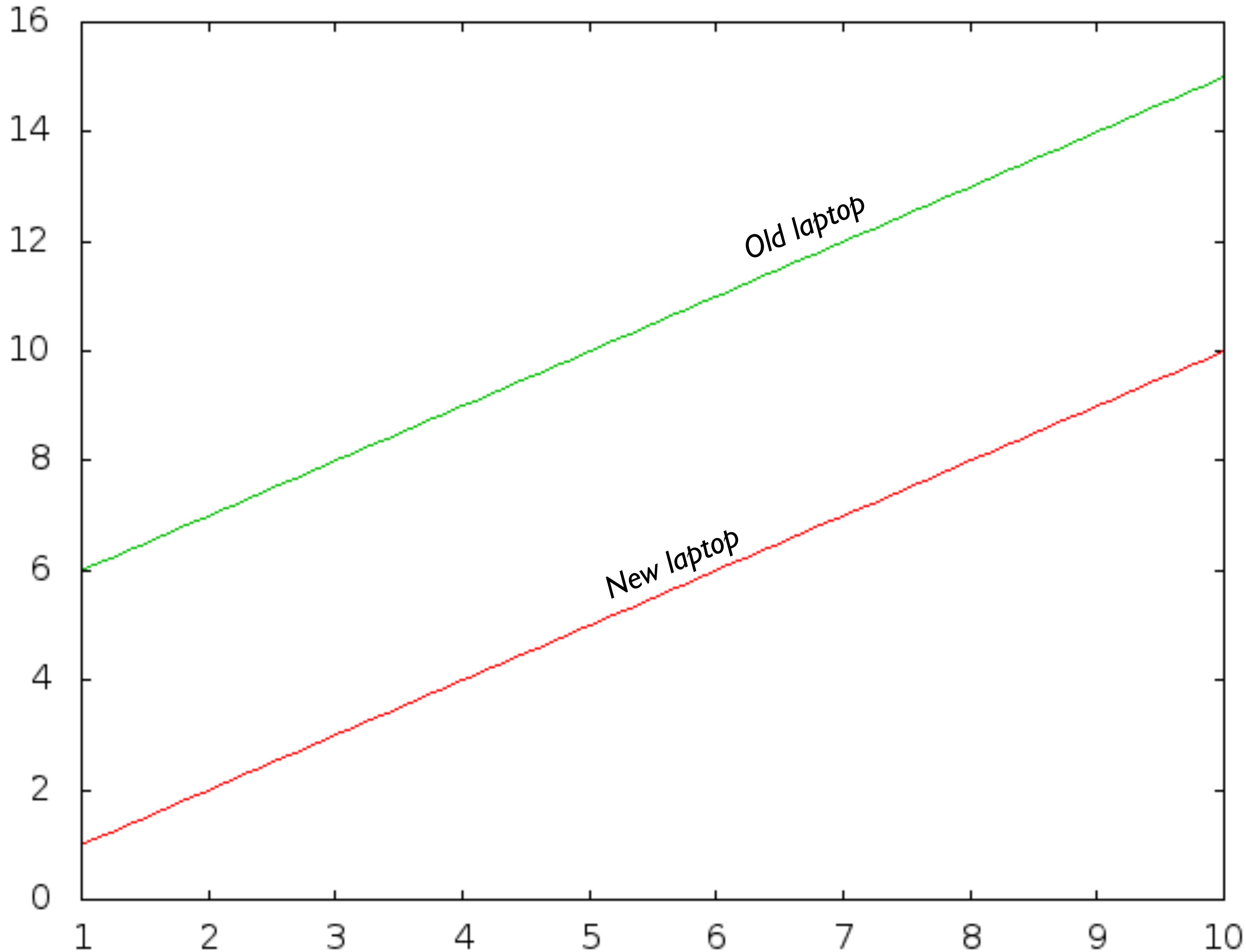
Which function is “faster”?

“Dominated”, in mathematical parlance





1. Analyze *large* N.



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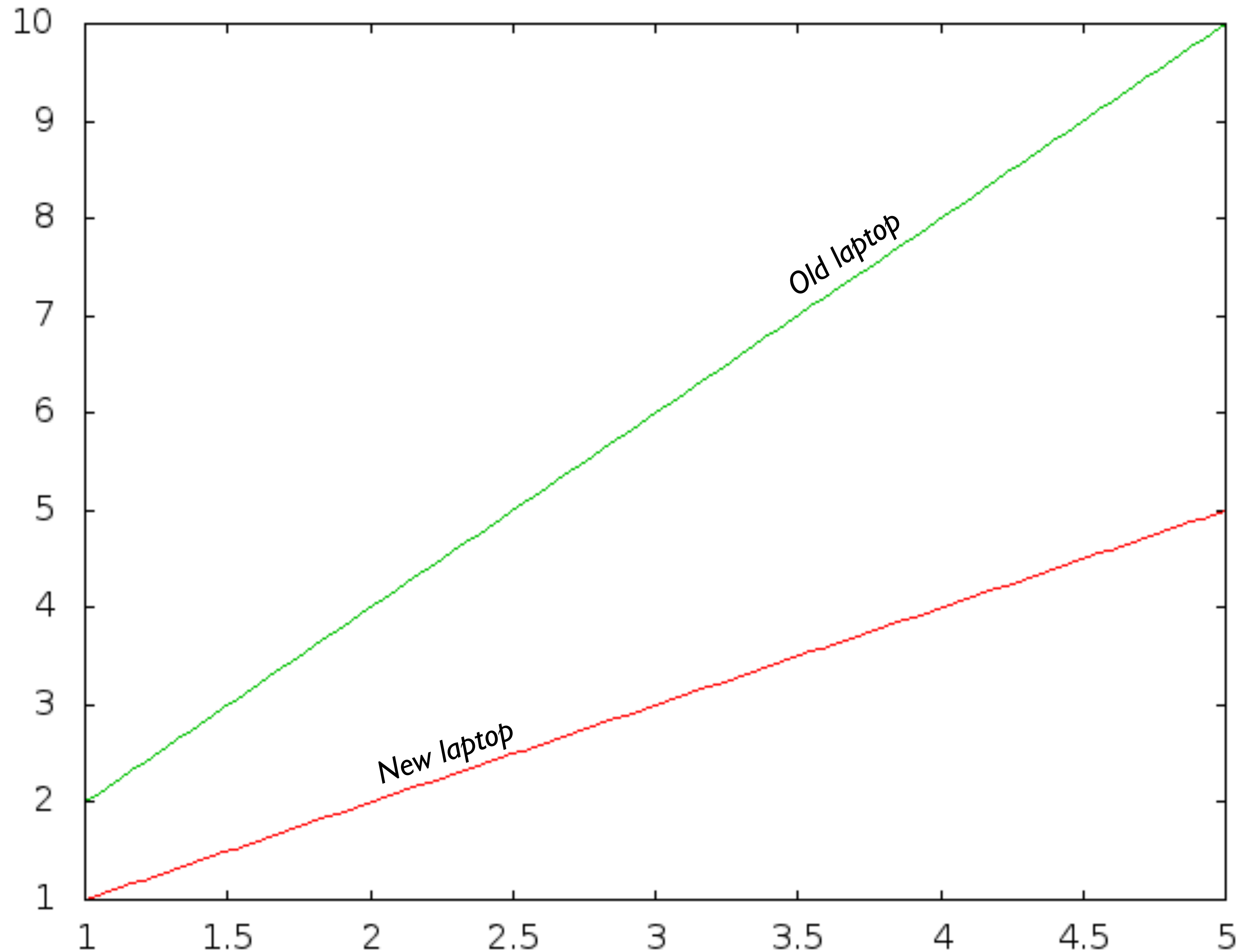


1. Analyze *large* N.

2. Ignore constants!

So, is $f(n)$ smaller than $g(n)$?

(Dominated by)

For "big enough" N

Give or take a constant

So, is *f(n)* smaller than *g(n)*?

(Dominated by)

For "big enough" N

Give or take a constant

Is $$f(n) < \qquad g(n)\ \forall n$$ what we want?

So, is *f(n)* smaller than *g(n)*?

(Dominated by)

For "big enough" N

Give or take a constant

Is $$f(n) < \quad g(n) \ \forall n > n_0$$ what we want?

Can be as large as you want!

So, is *f*(*n*) smaller than *g*(*n*)?

(Dominated by)

For "big enough" N

Give or take a constant

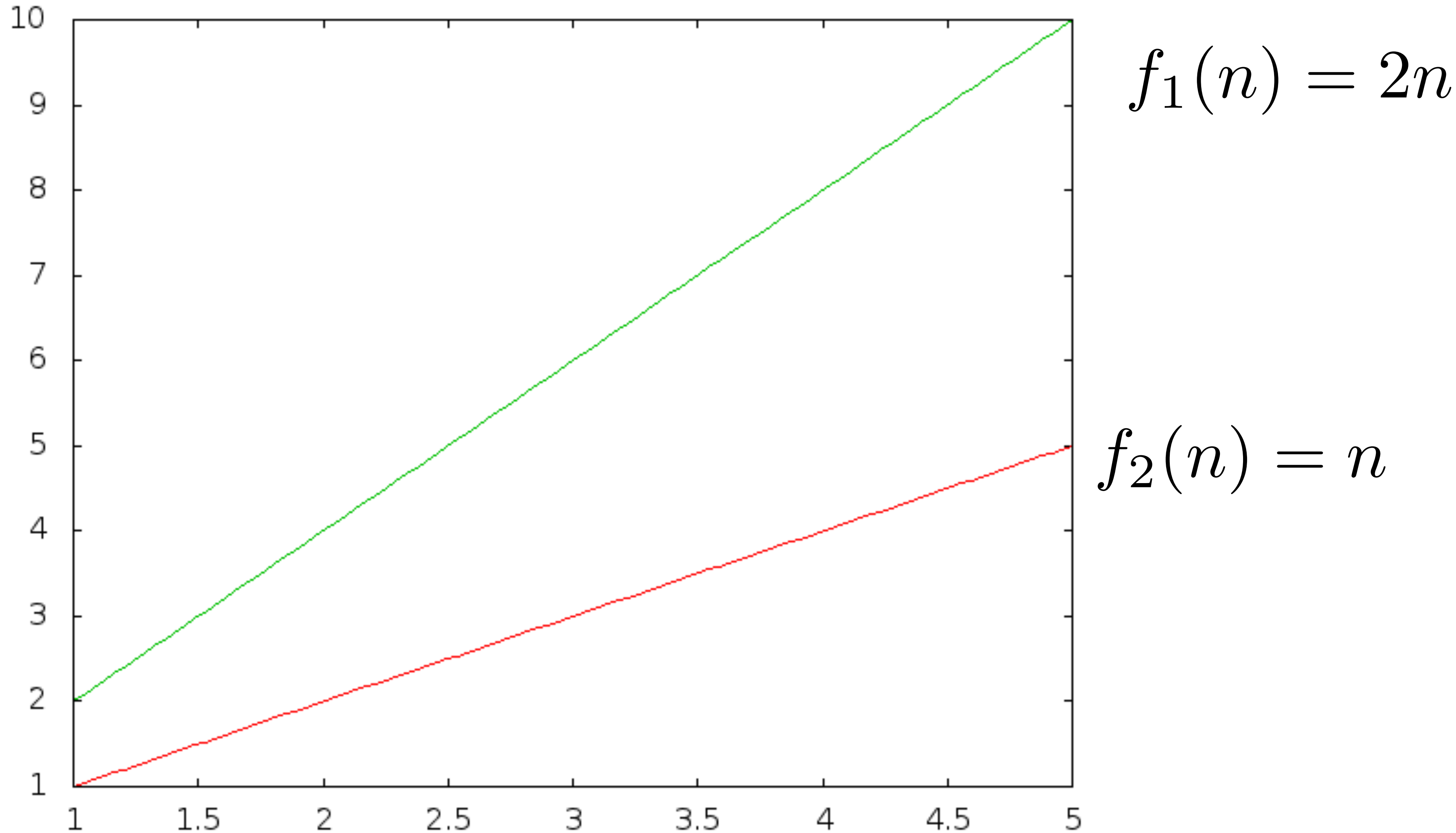
$$f(n) < c \cdot g(n) \ \forall n > n_0$$

Your choice of constant.

Can be as large as you want!

If c and n_0 exist, we say $f(n) \in O(g(n))$

$$f(n) < c \cdot g(n) \ \forall n > n_0 \text{ means } f(n) \in O(g(n))$$



Let us know: http://goo.gl/VHT2q

$$f(n) < c \cdot g(n) \ \forall n > n_0$$ means $$f(n) \in O(g(n))$$

$f_0(n) = n$

$f_1(n) = n^2 + 10$

$f_2(n) = n!$

$f_3(n) = n \log n$

$f_4(n) = n^n$

$f_5(n) = n \log(n^2)$

$f_6(n) = \log n$

$f_7(n) = \frac{1}{10^6} n^3 + 10^6 n^2 + 12n + 4$

$f_8(n) = n^2 \log n$

$f_9(n) = \sum_{i=1}^{n} i$

$f_{10}(n) = 2^n$

$f_{11}(n) = 3^n$

Fill out our form: http://goo.gl/9vpuE