

# Algorithm performance



Asymptotic analysis

# Drop constants

$$10000000 = O(1)$$

**Keep only dominant term**

**Keep only dominant term**

**fastest growing**



**Keep only dominant term**

$$3n+3 = O(3n)$$

**Keep only dominant term**

$$3n+3 = O(3n) = O(n)$$



# Examples?

# IVQ

- $f(n) = 3 \log_2 n + 4n \log_2 n + n$ . Which of the following is true?
  - $f(n) = O(\log_2 n)$
  - $f(n) = O(n \log_2 n)$
  - $f(n) = O(n^2)$  \*\* In response, industry / academic use of  $O$
  - $f(n) = O(n)$
- $f(n) = 100$ . Which of the following is true?
  - $f(n) = O(2^n)$
  - $f(n) = O(n^2)$
  - $f(n) = O(n)$
  - $f(n) = O(1)$



# Formally

$$f(n) = O ( g(n) )$$

means

there are constants  $N$  and  $c$  so that for each  $n > N$ ,

$$f(n) \leq C g(n)$$



**Next up ...**

**Analyzing code**