Quadratic Time

At least $\Theta(n^2)$

- Say $f = \Theta(g)\{f, g : \mathbb{N} \to \mathbb{R}_{n \geq 0}$

$f(n) = \Theta(g(n))$ if $f(n) = O(g(n)), g(n) = O(f(n))$

Asymptotic Equality

$f\ g$ if $\lim_{n\to\infty} \frac{f(n)}{g(n)} = 1$

$2n^3 - n\ 2n^3$

$n!\ \sqrt{2\pi n}(n/e)^n$

$f(n) = 2n^2 + n\log n$

$g(n) = 3n^2 - \sqrt{n} + 1$

Claim: $f(n)\frac{3}{2}\ g(n)$?

$f(n)\ \ /g(n)$

$\lim_{n\to\infty} \frac{f(n)3/2}{g(n)} = 1$

Last time:

$\frac{3}{2}f(n) = 3n^2 + o(n^2)$

We can ignore the smaller thing.

Fact: $f(n) = f_1(n) + o(f_1(n))$

$g(n) = g_1(n) + o(g_1(n))$

$f = O(g) \iff f_1 = O(g_1)\ f = o(g) \iff f_1 = o(g_1)$

Since we can do this, we can divide both sides of the $\lim$ by $3n^2$.

$\lim_{n\to\infty} \frac{1+(\frac{3/2n\log n}{3n^2})}{''}$

Omega

$f(n) = \Omega(g(n))$ if $c_1 g(n) \leq f(n) \forall n \geq n_0$ for some c_1, n_0.

Asymptotic ratio:

$1/2 + 2/4 + 3/8 + 4/16 + 5/32 + \ldots + \frac{n}{2^n}$

Assymptotic ratio f: $\lim_{n\to\infty} \frac{f(n+1)}{f(n)}$