Landau notation

In order to deal with results in extremal combinatorics we need to recall the so-called Landau notation (also called asymptotic notation):

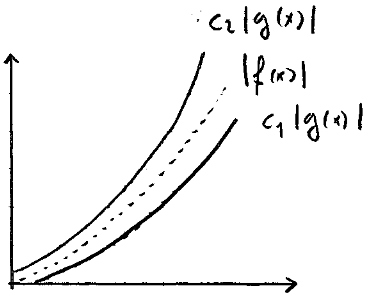
Def/ Let $f, g : \mathbb{R} \to \mathbb{R}$ be functions. Then we write that $\underline{f(x) = O(g(x))}$ if $|f(x)| \leq C|g(x)|$ for all $x \geq x_0$. On the other direction, if $f(x) = O(g(x))$ then $g\underline{(x) = \Omega(f(x))}$.

Def/ Let $f, g : \mathbb{R} \to \mathbb{R}$ be functions. Then we write that $\underline{f(x) = o(g(x))}$ if $\lim\limits_{x \to \infty} \frac{f(x)}{g(x)} = 0$. Equivalently, if $f(x) = o(g(x))$, then $g\underline{(x) = \omega(f(x))}$.

We finally write $\underline{f(x) = \Theta(g(x))}$ if $f(x) = O(g(x))$ and $g(x) = O(f(x))$. There is some equivalence notation used more frequently in other disciplines (see, analytic number theory):

Vinogradov's not.	Landau's notation
$f(x) \ll g(x)$	$f(x) = O(g(x))$
$f(x) \gg g(x)$	$f(x) = \Omega(g(x))$
$f(x) \sim g(x)$	" $\lim\limits_{x \to \infty} f(x)/g(x) = 1$ "
$f(x) \asymp g(x)$	$f(x) = \Theta(g(x))$

So, in particular, if $f(x) = g(x) + o(g(x))$, then $f(x) \sim g(x)$.



$\Rightarrow f(x) \asymp g(x)$