Lecture 1

$5n^3$, $100n^2$

$\frac{100n^2}{5n^3} = \frac{20}{n}$

n

$n \uparrow$

0

$n^{1000,000}$

$999,999$

n

$T(n) = 32n^2 + 17n + 1$

$O(n)$ $\quad 32n^2 + 17n + 1 \leq cn$, $\forall n \geq n_0$

$f(n) = \theta(g(n)) \iff f(n) = O(g)$, $f = \Omega(g)$

$f = O(g)$

$\Rightarrow$

c_1, c_2, n_0.

$c_1 g(n) \leq f(n) \leq c_2 g(n) \quad \forall n \geq n_0$

$f = \Omega(g)$

$f = \theta(g)$

$\Leftarrow$ $f = O(g) \Rightarrow \exists n_0, c_1, \quad f(n) \leq c_1 g(n) \quad \forall n \geq n_0$

$f = \Omega(g) \Rightarrow \exists n_1, c_2, \quad f(n) \geq c_2 g(n) \quad \forall n \geq n_1$

$n_2 = \max(n_0, n_1)$

$c_2 g(n) \leq f(n) \leq c_1 g(n)$, $\forall n \geq n_2$?