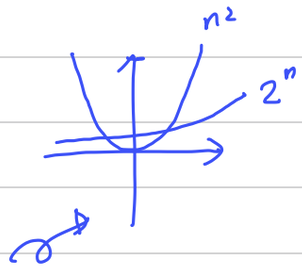
Week3_ 부교재 연습문제

#문제01-1 → 빅오 인가?

O( ) → 함수의 상한

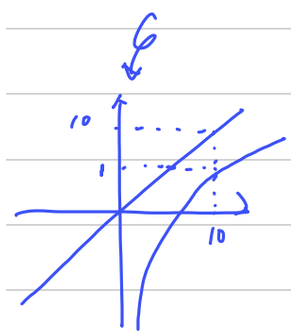


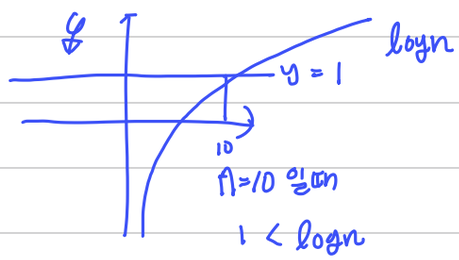
$3n+2 \to O(n)$ $\quad 7n^3+3n^2+2 \to O(n^3)$ $\quad 2^n+n^2 \to O(n^2)$

$n+\log n \to O(n)$ $\quad n+n\log n \to O(n\log n)$ $\quad 2^n+n^3 \to O(n^3)$

$n\times 1$

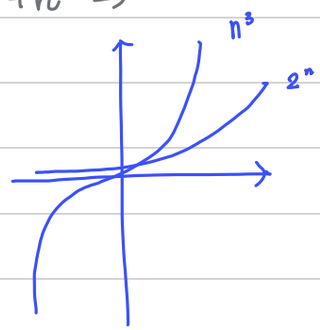
$n(1+\log n)$





$n=10$ 일때

$1 < \log n$



#문제 01-2 [빅오의 증명]

- $T(n) = 3n+2$ $\quad \triangleright\ O(n)$

$n \to x$ 라 하자 :

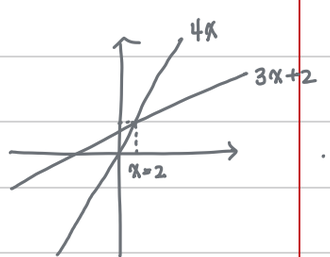
$f(x) = 3x+2$ $\quad g(x) = x$ $\quad |f(x)| \le c|g(x)|$ 가 존재?

$3x+2 \le c\cdot x$ $\quad [c=1]\ 3x+2 \le x$ (x)

$[c=2]\ 3x+2 \le 2x$ (x)

$[c=3]\ 3x+2 \le 3x$ (x)

$[c=4]\ 3x+2 \le 4x$



$\therefore x \ge 2,\ c=4 \Rightarrow n \ge 2,\ c=4$ 일 때 $f(n) \le c\cdot g(n)$ 만족

$\therefore f(n) = O(g(n)$ 이다.

- $T(n) = 7n^3+3n^2+2$ $\quad \triangleright\ O(n^3)$

$f(x) = 7x^3+3x^2+2$

$g(x) = x^3$

$f(x) \le c\cdot g(x)$ 가 존재? $\quad 27,\ 216$

$7x^3+3x^2+2 \le c\cdot x^3$

$[c=1 \sim 7]$ (x)

if $(c==8)$? $\Rightarrow$

x	$f(x)$	$8\cdot g(x)$	
1	$7+3+2$	$8\cdot 1$	$12 > 8$
2	$7\cdot 2^3+3\cdot 2^2+2$	$8\cdot 2^3$	$216 > 64$
3	$\underbrace{7\cdot 3^3+3^3}_{8\cdot 3^3}+2$	$8\cdot 3^3$	$8\cdot 3^3+2 > 8\cdot 3^3$
4	$7\cdot 4^3+3\cdot 4^2+2$	$8\cdot 4^3$	$<$
	$31\cdot 4^2+2$	$8\cdot 4^3$	
		$31\cdot 4^2+4^2$	

$c=8 \quad n \ge 4$ $\quad f(x) \le c\cdot g(x)$

$\therefore f(n) = O(g(n)$ 이다.