Taylor 다항식

$\{a_n\}$ : a. seq

$\sum_{n=1}^{\infty} a_n$ : a series.

$\sum_{n=0}^{\infty} c_n x^n$ : a power series $= f(x)$, $c_n = \frac{f^{(n)}(0)}{n!}$

$= c_0 + c_1 x + c_2 x^2 + \cdots$

ex) $\frac{1}{1-x} = 1 + x + x^2 + \cdots + x^n + \cdots$, $|x| < 1$

$\sum_{n=0}^{\infty} c_n (x-a)^n = f(x)$, $c_n = \frac{f^{(n)}(a)}{n!}$

$= \sum_{k=0}^{n} \frac{f^{(k)}(\alpha)}{k!}(x-\alpha)^n + \sum_{k=n+1}^{\infty} \frac{f(a)}{k!}(x-a)^n$

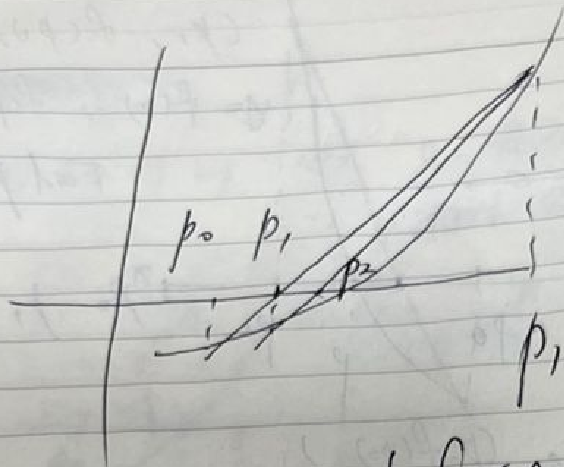
$= \underbrace{T_n(x)}_{\text{근사다항식}} + \underbrace{R_n(x)}_{\text{나머지}}$ $R_n(x) = \frac{f^{(n+1)}(\xi)}{(n+1)!} \cdot (x-$

테일러 급수 VS 테일러 정리.

esp, $n=0$ $f(x) = T_0(x) + R_0(x)$

$= f(a) + f'(\xi)(x-a)$

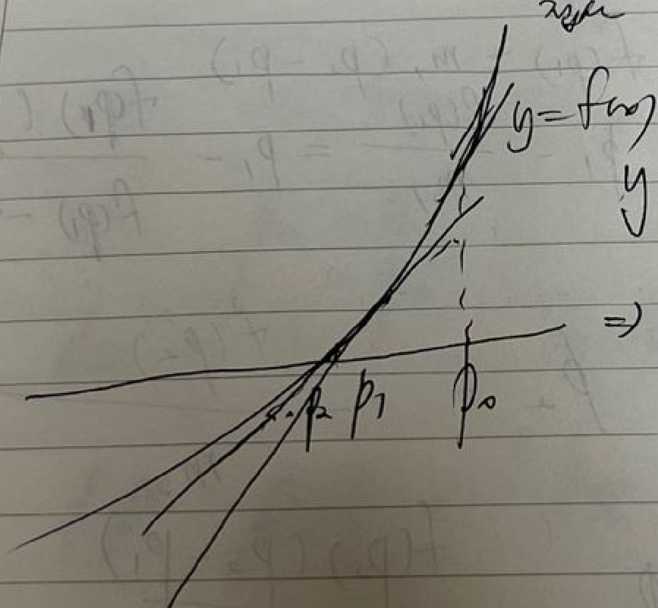
$\Leftrightarrow \frac{f(x)-f(a)}{x-a} = f'($




가위치법 ×

$$|f(p_0)| < |f(p_1)|$$

2.4 뉴턴 방법



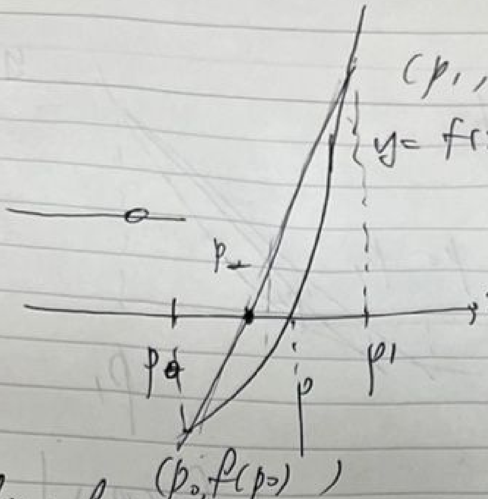

$$y = f(p_0) + f'(p_0)(x-p_0)\Big|_{(p_1,0)}$$

$$\Rightarrow 0 = f(p_0) + f'(p_0)(p_1-p_0)$$

$$\Rightarrow p_1 = p_0 - \frac{f(p_0)}{f'(p_0)}$$

$$p_{n+1} = p_n - \frac{f(p_n)}{f'(p_n)}$$

할선법.




$(p_1, f(p_1))$.

$y = f(x) \to f(p_1) + m_1(x - p_1)$.

Find $p$ s.t. $f(p) = 0$

$p_0, p_1, p_2 \cdots p_n$

$\cdots \to p$

$f(p_0)f(p_1) < 0$

$$m_1 = \frac{f(p_1) - f(p_0)}{p_1 - p_0}$$

$\Rightarrow 0 = f(p_1) + m_1(p_2 - p_1)$

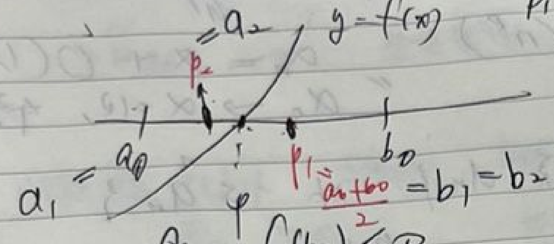
$$\Rightarrow p_2 = p_1 - \frac{f(p_1)}{m_1} = p_1 - \frac{f(p_1)(p_1 - p_0)}{f(p_1) - f(p_0)}$$

$$p_3 = p_2 - \frac{f(p_2)}{m_2}$$

$$= p_2 - \frac{f(p_2)(p_2 - p_1)}{f(p_2) - f(p_1)}$$

단변수 방정식의 해

$f(x)=0$ 의 해 $\iff$ $y=f(x)$ 와 $y=0$
교점의 $x$ 좌표.




$p_1 \quad p_2 \quad p_3 \cdots \quad p_n \cdots$

$\to p$

$|p - p_n| < TOL$

or $f(a_0) f(b_0) < 0$

$sgn(f(a_0))\, sgn(f(b_0)) < 0$

if : $f(a_0) f(p_1) < 0$, $y=f(x)$

$a_1 = a_0$

$b_1 = p_1$, $\quad b_1 = b_0$

else : $a_1 = p_1$,

$$|p - p_n| < \frac{|b_0 - a_0|}{2^n} < TOL$$