WEEK05. 적분,미분

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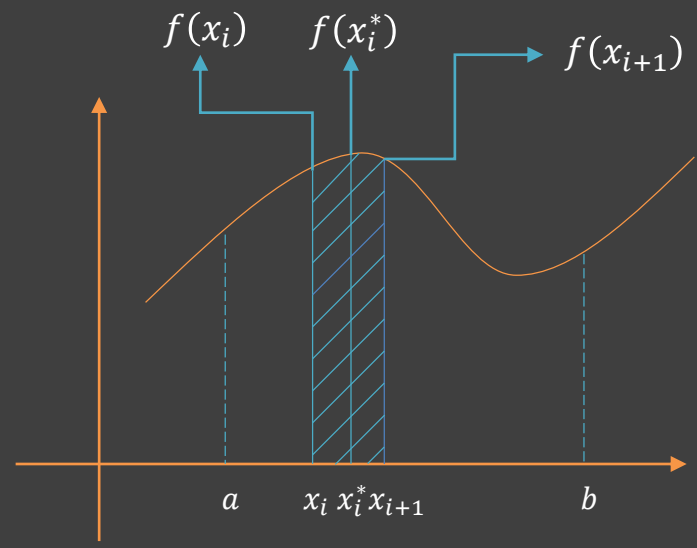
적분, 미분 소개

미분(differential) : $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}=f'(x)$

원시함수(anti-derivative) : $F'(x)=f(x), F(x)$

정적분(Definite integral) : $\int_a^b f(x)dx$

부정적분(indefinite integral) : $\int f(x)dx=F(x)+c$



$\Delta x_i := x_{i+1}-x_i$

$\lim_{n\to\infty}\sum_{i=1}^{n} f(x_i^*)\Delta x_i$

By fundamental theorem

$F(b)-F(x)$

Newton's Cotes Formula

Newton's Cotes Formula

$\int_a^b f(x)dx \approx \int_a^b P_n(x)dx$ where $P_n(x) = a_n x^n + \cdots + a_1 x + a_0$

Simpson's Rule

Simpson's $\frac{1}{3}$ Rule

$$I = \int_a^b f(x)dx \approx \frac{h}{3}\left[f_0 + 4\sum_{i:odd}^{n-1} f_i + 2\sum_{i:even}^{n-2} f_i + f_n\right]$$

Simpson's $\frac{3}{8}$ Rule

$$I = \int_a^b f(x)dx \approx \frac{3h}{8}\left[f_0 + 3\sum_{i=1,4,7\ldots}^{n-2} (f_i + f_{i+1}) + 2\sum_{i=3,6,9\ldots}^{n-3} f_i + f_n\right]$$