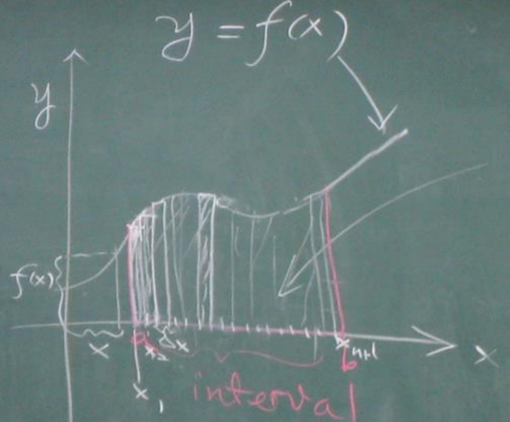


$\Delta x_1 = x_2 - x_1 \quad \Delta x_2 = x_3 - x_2$

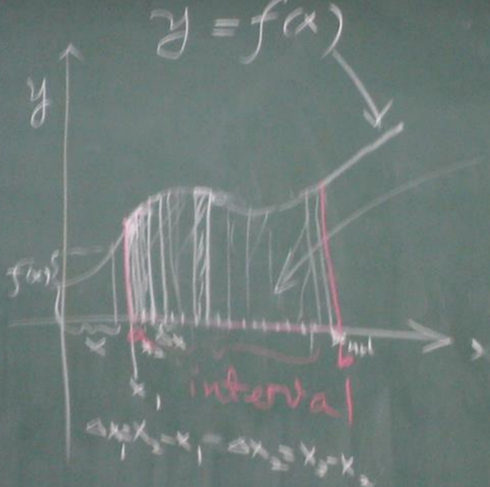
$$\sum_{i=1}^{n} f(x_i)\Delta x_i = f(x_1)\underbrace{\Delta x_1}_{x_2-x_1} + f(x_2)\Delta x_2 + \cdots + f(x_n)\underbrace{\Delta x_n}_{x_{n+1}-x_n}$$

$$\Delta x = \max(\Delta x_i,\ i = 1, 2 \ldots n)$$

$$\| $$

$$\frac{b-a}{n} \to 0$$

$$\int_a^b f(x)\,dx = \lim_{\max(\Delta x_i)\to 0} \sum_{i=1}^{n} f(x_i)\Delta x_i$$

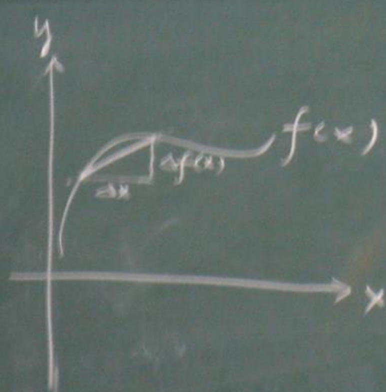


$$\sum_{i=1}^{n} f(x_i)\Delta x_i = f(x_1)\underbrace{\Delta x_1}_{x_2-x_1} + f(x_2)\Delta x_2 + \cdots + f(x_n)\underbrace{\Delta x_n}_{x_{n+1}-x_n}$$

$$\Delta x = \max(\Delta x_i,\ i=1,2,\dots,n)$$

$$\Delta x = \frac{b-a}{n} \to 0$$

$$\int_a^b f(x)\,dx = \lim_{\max(\Delta x_i)\to 0} \sum_{i=1}^{n} f(x_i)\Delta x_i$$



$$\lim_{\Delta x\to 0}\frac{\Delta f(x)}{\Delta x} = \frac{df(x)}{dx}$$

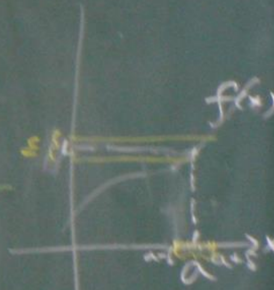
導函数 (derivative)

differentiation

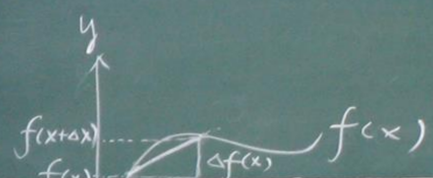
$$\lim_{x \to a} f(x) = L$$

$\forall \varepsilon > 0, \ \exists \delta > 0 \ \ni \ |x-a| < \delta \Rightarrow |f(x) - L| < \varepsilon$

For every $\varepsilon > 0$, there exists a $\delta > 0$ so that whenever $|x-a| < \delta$, $|f(x) - L| < \varepsilon$.



$|x-a| < \delta$



$$\lim_{\Delta x \to 0} \frac{\Delta f(x)}{\Delta x} = \frac{df(x)}{dx}$$

tive)

$y = f(x)$

$$\sum_{i=1}^{n} f(x_i)\Delta x_i = f(x_1)\underbrace{\Delta x_1}_{x_2-x_1} + f(x_2)\Delta x_2 + \cdots + f(x_n)\underbrace{\Delta x_n}_{x_{n+1}-x_n}$$

$$\Delta x = \max(\Delta x_i,\ i=1,2\ldots n)$$

$$\Delta x = \frac{b-a}{n} \to 0$$

$$\mathcal{F}(x) \equiv \int_a^x f(x')\,dx' = \lim_{\max(\Delta x_i)\to 0} \sum_{i=1}^{n} f(x_i)\Delta x_i$$

積分

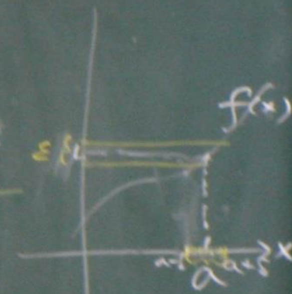
integral

integration

$$\lim_{x \to a} f(x) = L$$

$$\forall \varepsilon > 0,\ \exists \delta > 0 \ni |x-a| < \delta \Rightarrow |f(x) - L| < \varepsilon$$

For every $\varepsilon > 0$, there exists a $\delta > 0$ so that whenever $|x-a| < \delta$, $|f(x)-L| < \varepsilon$.



$|x-a| < \delta$

$$\mathcal{F}(x) + c \equiv \int_a^x f(x)\,dx$$

constant

$$\mathcal{F}(b) + c = \int_a^b f(x)\,dx$$

$$\Downarrow$$

$$\mathcal{F}(a) + c = \int_a^a f(x)\,dx = 0 \Rightarrow c = -\mathcal{F}(a)$$

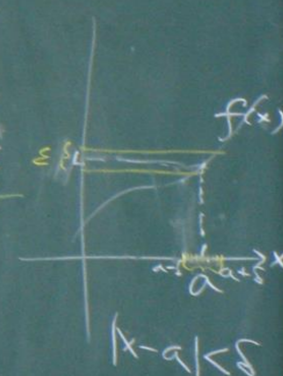
$$\frac{d\mathcal{F}(x)}{dx} = f(x)$$

$$\int_a^x f(x)\,dx = \mathcal{F}(x) - \mathcal{F}(a)$$

$$\lim_{x \to a} f(x) = L$$

$$\forall\ \varepsilon > 0,\ \exists\ \delta > 0 \ni\ |x-a| < \delta \Rightarrow |f(x) - L| < \varepsilon$$

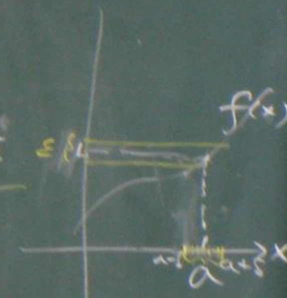
For every $\varepsilon > 0$, there exists a $\delta > 0$ so that
whenever $|x-a| < \delta$, $|f(x) - L| < \varepsilon$.



$$\lim_{x\to a} f(x) = L$$

$$\forall\, \varepsilon > 0,\ \exists\, \delta > 0 \ni |x-a| < \delta \Rightarrow |f(x)-L| < \varepsilon$$

For every $\varepsilon > 0$, there exists a $\delta > 0$ so that
whenever $|x-a| < \delta$, $|f(x)-L| < \varepsilon$.



$|x-a| < \delta$

$$\lim_{x\to a} f(x) = L, \quad \lim_{x\to a} g(x) = M$$

$$\Rightarrow \lim_{x\to a} f(x)\,g(x) = LM$$

$$\lim_{x\to a} \{c_1 f(x) + c_2 g(x)\} = c_1 L + c_2 M$$

$$f(x) = \cancel{\frac{x^2+2x-3}{x-1}} \qquad \cancel{(x+3)(x-1)}$$

$\longrightarrow$ $x \to 1$

$x \to a$

M

$$g(x) = \frac{1}{x-1}$$