자연상수 e 의 정의

$$\therefore\ e = \lim_{t\to\infty}(1+t)^{\frac{1}{t}} = \lim_{t\to 0}(1+\frac{1}{t})^{t}$$

- $f(x) = \ln x \ \rightarrow\ f'(x) = \frac{1}{x}$ **증명**

$$f'(x) = \lim_{h\to 0}\frac{\ln(x+h) - \ln x}{h} = \lim_{h\to 0}\frac{\ln(\frac{x+h}{x})}{h} = \lim_{h\to 0}\frac{1}{h}ln(\frac{x+h}{x})$$

$$= \lim_{h\to 0}\ln(\frac{x+h}{x})^{\frac{1}{h}} = \lim_{h\to 0}\ln(\frac{x+h}{x})^{\frac{1}{x}=\frac{x}{h}} = \lim_{h\to 0}\frac{1}{x}ln(\frac{x+h}{x})^{\frac{x}{h}} = \frac{1}{x}\lim_{h\to 0}\ln(\frac{x+h}{x})^{\frac{x}{h}}$$

$$= \frac{1}{x}\lim_{h\to 0}\ln(1+\frac{h}{x})^{\frac{x}{h}} = \frac{1}{x}lne = \frac{1}{x}$$

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