

로그함수

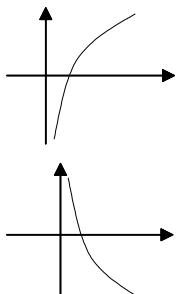
$$1. y = \log_a x \quad \begin{cases} a > 1 & : \text{증가} \\ 0 < a < 1 & : \text{감소} \end{cases}$$

치역 : y 는 모든 실수

정점(1,0) 을 지난다.

점근선 : y 축($x=0$)

지수함수와 log 함수는

역함수관계 (즉 $y=x$ 대칭)

$$2. y = \log_2 x \quad y = \log_{\frac{1}{2}} x = \log_{2^{-1}} x = -\log_2 x$$

$$y = \log_2(3x-6) \quad y = \log_2(3x+6)+3$$

3. $f(x) = \log_a x$ 의 성질

$$f(xy) = \log_a xy = \log_a x + \log_a y = f(x) + f(y)$$

$$f\left(\frac{x}{y}\right) = \log_a \frac{x}{y} = \log_a x - \log_a y = f(x) - f(y)$$

$$f(x^n) = \log_a x^n = n \log_a x = nf(x)$$

$$f(x^2) = \log_a x^2 = 2 \log_a x = 2f(x)$$

$$f\left(\frac{1}{x}\right) = \log_a \frac{1}{x} = \log_a x^{-1} = -\log_a x = -f(x)$$

$$f(x) + f\left(\frac{1}{x}\right) = \log_a x + \log_a \frac{1}{x} = \log_a 1 = f(1) = 0$$

4. 치환

$$\log_2 x = t \quad \dots \quad t \text{ 는 모든 실수}$$

$$\log_2 4x^2 = \log_2 4 + \log_2 x^2 = 2 + 2t$$

$$\log_2 2x = \log_2 2 + \log_2 x = 1 + t$$

$$\log_2 \sqrt[5]{\frac{x^2}{4}} = \log_2 \left(\frac{x^2}{4} \right)^{\frac{1}{5}} = \frac{1}{5} \log_2 \frac{x^2}{4}$$

$$\log_2 4x = \log_2 4 + \log_2 x = 2 + t$$

$$= \frac{1}{5} (\log_2 x^2 - \log_2 4) = \frac{1}{5} (2t - 2)$$

$$\log_2 \frac{x}{8} = \log_2 x - \log_2 8 = t - 3$$

$$\log_2 x^{\log_2 x} = \log_2 x \cdot \log_2 x = (\log_2 x)^2 = t^2$$

$$\log_2 \frac{1}{x} = \log_2 x^{-1} = -\log_2 x = -t$$

$$\log_2 2x^2 = \log_2 2 + \log_2 x^2 = 1 + 2t$$

$$\log_2 x^2 = 2 \log_2 x = 2t$$

$$\log_2(2x)^2 = 2 \log_2 2x = 2(\log_2 2 + \log_2 x)$$

$$\log_2 x^3 = 3 \log_2 x = 3t$$

$$= 2(1+t)$$

$$\log_2 \sqrt{x} = \log_2 x^{\frac{1}{2}} = \frac{1}{2} t$$

$$(\log_2 2x)^2 = (\log_2 2 + \log_2 x)^2 = (1+t)^2$$

5. 변역

$$\log_a b = t \quad \dots \quad t \text{ 는 실수}$$

$$a > 1 \quad 0 < b < 1 \quad \log_a b = t \quad \dots \quad t < 0$$

$$a > 1, \quad b > 1, \quad \log_a b = t \quad \dots \quad t > 0$$

$$0 < b < 1 \quad b > 1 \quad \log_a b = t \quad \dots \quad t < 0$$

$$0 < a < 1 \quad 0 < b < 1 \quad \log_a b = t \quad \dots \quad t > 0$$

$$1 < b < a \quad \log_a b = t \quad \dots \quad 0 < t < 1$$