$y=\dfrac{\ln(x+a)}{x}$의 그래프

※ 다음 각 함수의 그래프의 개형을 그리시오.

1. $y=\dfrac{\ln x}{x}$

2. $y=\dfrac{\ln(x-1)}{x}$

3. $y=\dfrac{\ln(x+1)}{x}$

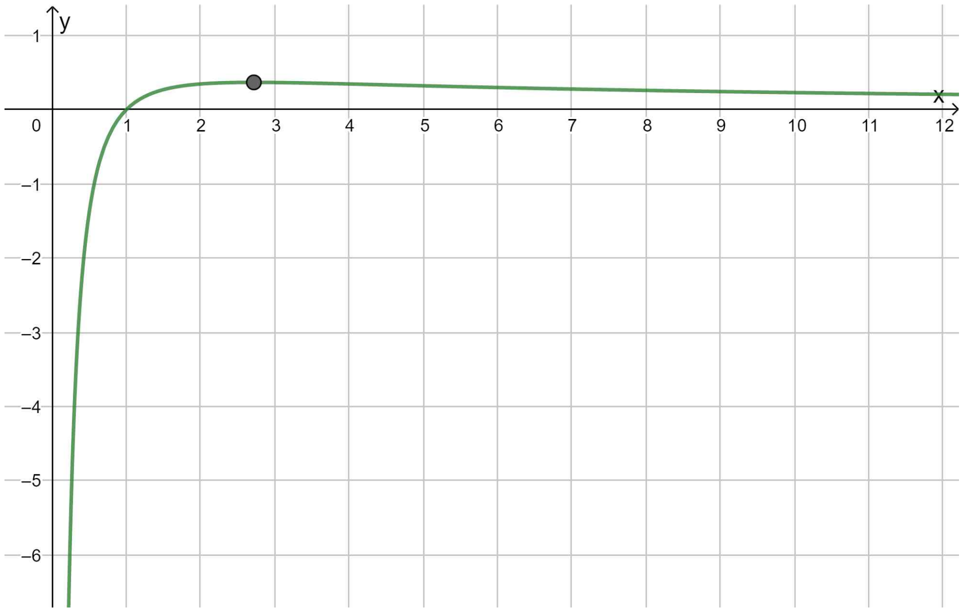
4. $y = \dfrac{\ln(x+2)}{x}$

5. $y = \dfrac{\ln\left(x+\dfrac{1}{2}\right)}{x}$

$y=(\ln x)^n$의 그래프 -해답-

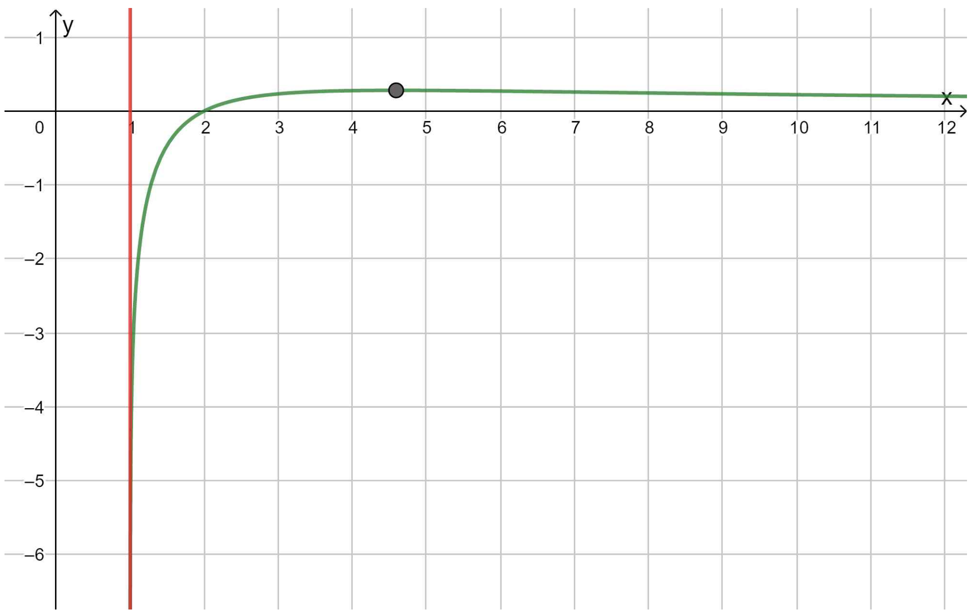
1. $y=\dfrac{\ln x}{x}$ $(x>0)$ ⇨ $(0,\ 0)$, $(x,\ \ln x)$를 지나는 직선의 기울기

$\lim\limits_{x\to 0+}\dfrac{\ln x}{x}=-\infty$, $\lim\limits_{x\to\infty}\dfrac{\ln x}{x}=0$



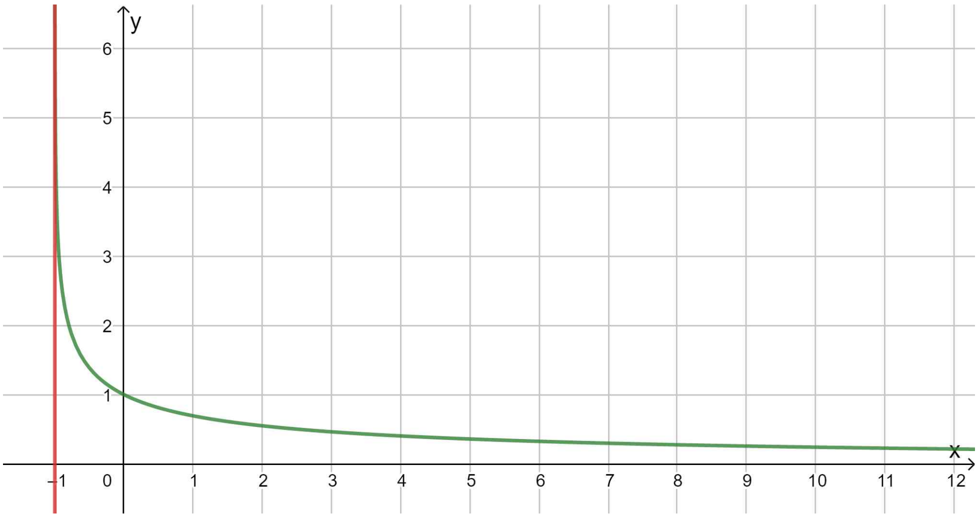
2. $y=\dfrac{\ln(x-1)}{x}$ $(x>1)$ ⇨ $(0,\ 0)$, $(x,\ \ln(x-1))$을 지나는 직선의 기울기

$\lim\limits_{x\to 1+}\dfrac{\ln(x-1)}{x}=-\infty$, $\lim\limits_{x\to\infty}\dfrac{\ln(x-1)}{x}=0$



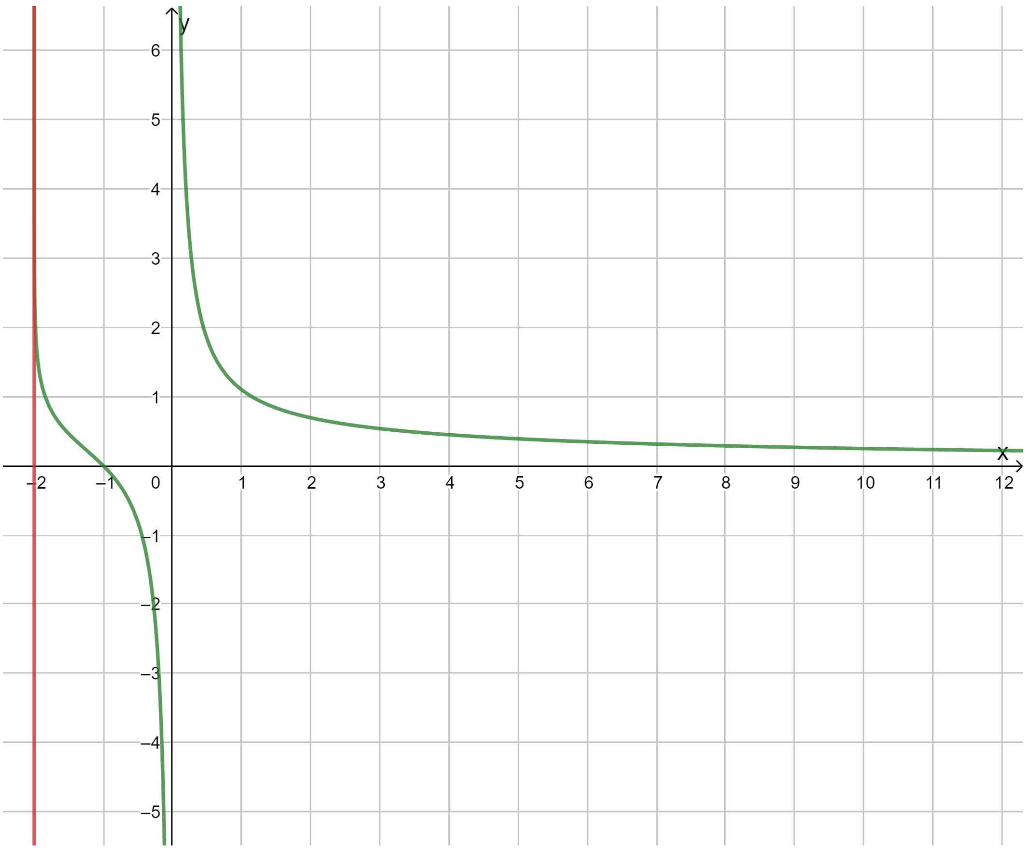
3. $y=\dfrac{\ln(x+1)}{x}$ $(x>-1,\ x\neq 0)$ ⇨ $(0,\ 0)$, $(x,\ \ln(x+1))$을 지나는 직선의 기울기

$\lim\limits_{x\to -1+}\dfrac{\ln(x+1)}{x}=\infty$, $\lim\limits_{x\to 0}\dfrac{\ln(x+1)}{x}=1$, $\lim\limits_{x\to\infty}\dfrac{\ln(x+1)}{x}=0$



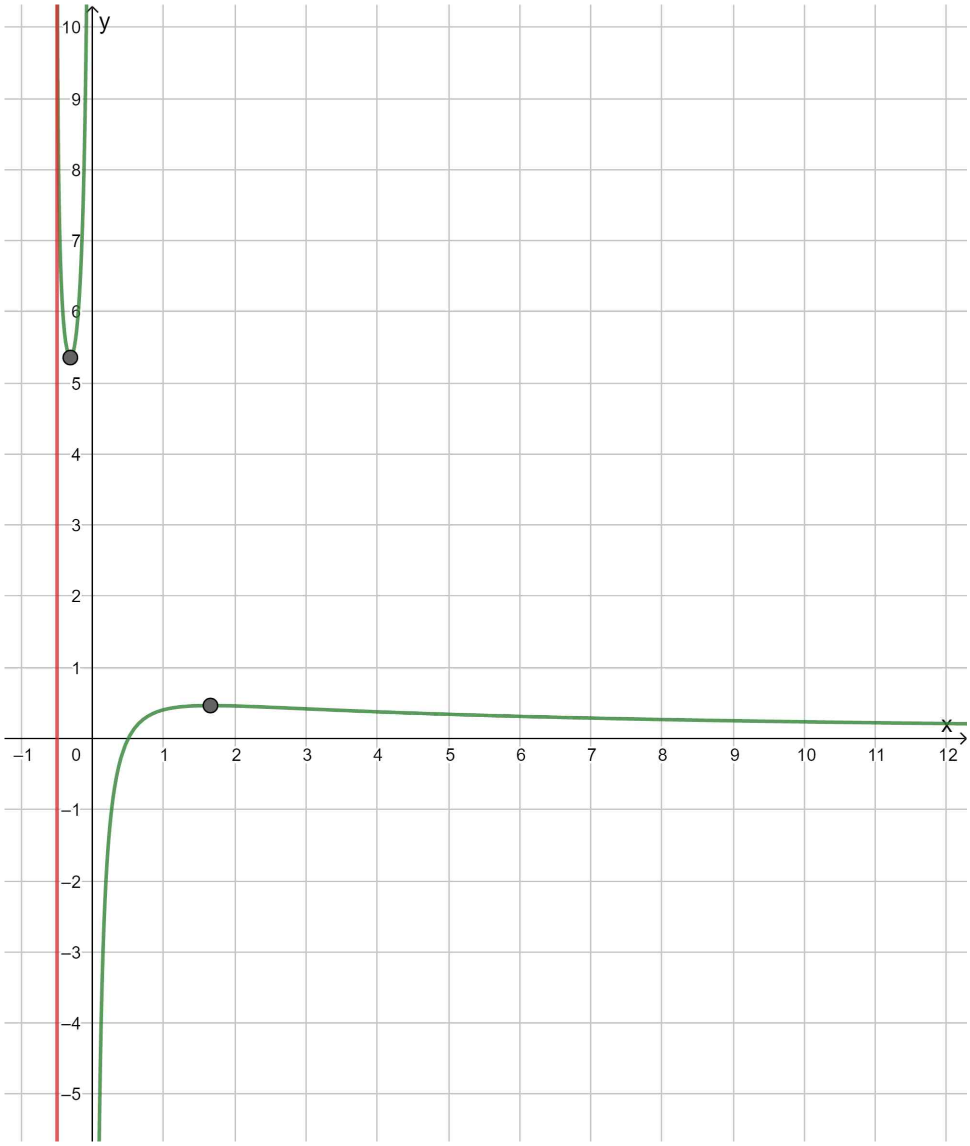
4. $y=\dfrac{\ln(x+2)}{x}$ $(x>-2,\ x\neq 0)$ ⇨ $(0,\ 0)$, $(x,\ \ln(x+2))$를 지나는 직선의 기울기

$\lim\limits_{x\to -2+}\dfrac{\ln(x+2)}{x}=\infty$, $\lim\limits_{x\to 0-}\dfrac{\ln(x+2)}{x}=-\infty$, $\lim\limits_{x\to 0+}\dfrac{\ln(x+2)}{x}=\infty$, $\lim\limits_{x\to\infty}\dfrac{\ln(x+2)}{x}=0$



5. $y=\dfrac{\ln\left(x+\frac{1}{2}\right)}{x}$ $\left(x>-\frac{1}{2},\ x\neq 0\right)$ ⇨ $(0,\ 0)$, $\left(x,\ \ln\left(x+\frac{1}{2}\right)\right)$을 지나는 직선의 기울기

$$\lim_{x\to -\frac{1}{2}+}\frac{\ln\left(x+\frac{1}{2}\right)}{x}=\infty,\quad \lim_{x\to 0-}\frac{\ln\left(x+\frac{1}{2}\right)}{x}=\infty,\quad \lim_{x\to 0+}\frac{\ln\left(x+\frac{1}{2}\right)}{x}=-\infty,\quad \lim_{x\to \infty}\frac{\ln\left(x+\frac{1}{2}\right)}{x}=0$$



※ $y=\dfrac{\ln(x+a)}{x}$ 에서 $y'=\dfrac{\frac{x}{x+a}-\ln(x+a)}{x^2}=\dfrac{x-(x+a)\ln(x+a)}{x^2(x+a)}$