

#1-4

Examples: Find $f'(x)$.

(3)

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

$$f(x) = \ln x - \ln(x+1)$$

$$f'(x) = \frac{1}{x} - \frac{1}{x+1}$$

$$2) y = \ln \sqrt{\frac{x-1}{x+1}}$$

$$y = \frac{1}{2} [\ln(x-1) - \ln(x+1)]$$

$$y' = \frac{1}{2} \left[\frac{1}{x-1} \cdot \frac{1}{x+1} \right]$$

$$y' = \frac{1}{2} \left(\frac{x+1 - x+1}{(x+1)(x-1)} \right) = \frac{1}{2} \left(\frac{2}{x^2-1} \right) = \frac{1}{x^2-1}$$

$$3) y = \ln(\ln x)$$

$$y' = \frac{1}{\ln x} \cdot \frac{1}{x} = \frac{1}{x \ln x}$$