



↳



次の式を微分しなさい。

(1) $y = \log \left| \frac{x-a}{ax+a} \right|$

(2) $y = \log \left| \tan \frac{x}{2} \right|$

(3) $y = \log_2(x-1)$

(4) $y = \frac{\log x}{x^2}$

(1) $y = \log|x-a| - \log|ax+a| \quad \text{∴}$

$$y' = \frac{1}{x-a} - \frac{1}{ax+a} = \frac{ax+a-x+a}{a(x+1)(x-a)}$$

$$y' = \frac{ax-x+2a}{a(x+1)(x-a)}$$

(2) $y' = \frac{1}{\tan \frac{x}{2}} \cdot \left(\tan \frac{x}{2} \right)'$

$$= \frac{1}{\tan \frac{x}{2}} \cdot \frac{1}{\cos^2 \frac{x}{2}} \cdot \frac{1}{2}$$

$$= \frac{1}{\frac{\sin \frac{x}{2}}{\cos \frac{x}{2}}} \cdot \frac{1}{\cos^2 \frac{x}{2}} \cdot \frac{1}{2}$$

$$= \frac{1}{2 \sin \frac{x}{2} \cdot \cos \frac{x}{2}} = \frac{1}{\sin x}$$

$$y' = \frac{1}{\sin x}$$

(3) $y' = \frac{1}{(x-1) \log 2} \quad (\log_a x)' = \frac{1}{x \log_e a} \quad \text{∴}$

(4) $y' = \frac{\frac{1}{x} \cdot x^2 - 2x \log x}{x^4} = \frac{x - 2x \log x}{x^4}$

$$y' = \frac{1 - 2 \log x}{x^3}$$

