$$\frac{d}{dx}\left[\log_a x\right] = \frac{1}{(\ln a)x}$$

$$\frac{d}{dx}\left[\log_a u\right] = \frac{1}{(\ln a)u}\cdot u'$$

13. $y = \log_4\left(\frac{x^2-9}{x+5}\right)$

$$y = \log_4(x^2-9) - \log_4(x+5)$$

$$y' = \frac{1}{(\ln 4)(x^2-9)}\cdot\frac{d}{dx}(x^2-9) - \frac{1}{(\ln 4)(x+5)}\cdot\frac{d}{dx}(x+5)$$

$$= \frac{1}{(\ln 4)(x^2-9)}\cdot 2x - \frac{1}{(\ln 4)(x+5)}\cdot 1$$

$$= \frac{2x}{(\ln 4)(x^2-9)} - \frac{1}{(\ln 4)(x+5)}$$

$$= \frac{2x(x+5)}{(\ln 4)(x^2-9)(x+5)} - \frac{1(x^2-9)}{(\ln 4)(x^2-9)(x+5)}$$

$$= \frac{2x^2+10x}{(\ln 4)(x^2-9)(x+5)} - \frac{x^2-9}{(\ln 4)(x^2-9)(x+5)}$$

$$= \frac{2x^2+10x-x^2+9}{(\ln 4)(x^2-9)(x+5)}$$

$$= \frac{x^2+10x+9}{(\ln 4)(x^2-9)(x+5)}$$ PSD

DOTS

$$= \boxed{\frac{(x+1)(x+9)}{(\ln 4)(x+3)(x-3)(x+5)}}$$