

$$3. \ln(x^k)$$

Chain Rule

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$y = \ln(u), \quad u = x^k$$

$$\frac{d}{du} [\ln(u)] \cdot \frac{d}{dx} [x^k]$$

$$\frac{1}{u} \cdot kx^{k-1}$$

$$\frac{kx^{k-1}}{u}$$

$$\frac{kx^{k-1}}{x^k}$$

$$\frac{k}{x^{k-(k-1)}}$$

$$\frac{k}{x^{k-k+1}}$$

$$\frac{k}{x}$$