

(1)[5 points] Find the derivative of

$$y = e^{\cosh(3x)}$$

$$y' = e^{\cosh(3x)} \cdot \sinh(3x) \cdot 3$$

(2)[5 points] Evaluate

$$\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2} \sim \frac{0}{0}$$

$$\stackrel{H}{=} \lim_{x \rightarrow 0} \frac{e^x - 1}{2x} \sim \frac{0}{0}$$

$$\stackrel{H}{=} \lim_{x \rightarrow 0} \frac{e^x}{2}$$

$$= \boxed{\frac{1}{2}}$$

(3)[5 points] Evaluate

$$\lim_{x \rightarrow \infty} x - \ln x \sim \text{"}\infty - \infty\text{"}$$

$$= \lim_{x \rightarrow \infty} x \left( 1 - \frac{\ln x}{x} \right)$$

Look at  $\lim_{x \rightarrow \infty} \frac{\ln x}{x} \sim \frac{\infty}{\infty}$

$$\stackrel{H}{=} \lim_{x \rightarrow \infty} \frac{\left(\frac{1}{x}\right)}{1}$$

$$= 0$$

$$\therefore \lim_{x \rightarrow \infty} x \left( 1 - \frac{\ln x}{x} \right) = \infty(1-0) \\ = \boxed{\infty}$$