

$$7. \lim_{x \rightarrow 1} \frac{x^9 - 1}{x^5 - 1} = \lim_{x \rightarrow 1} \frac{9x^8}{5x^4} = \frac{9}{5}$$

$$9. \lim_{x \rightarrow (\pi/2)^+} \frac{\cos x}{1 - \sin x}$$

$$= \lim_{x \rightarrow \frac{\pi}{2}^+} \frac{\overset{\oplus}{+} \sin x}{\underset{\ominus}{+} \cos x} = -\infty$$

$$13. \lim_{x \rightarrow 0} \frac{\tan px}{\tan qx} = \lim_{x \rightarrow 0} \frac{p \cdot \sec^2 px}{q \cdot \sec^2 qx} = \frac{p}{q}$$

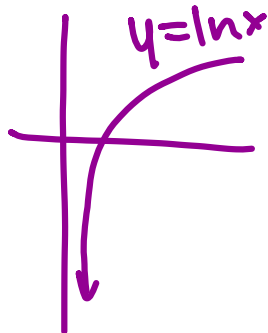
$x \rightarrow 0, \sec^2 x \Rightarrow 1$

$$11. \lim_{t \rightarrow 0} \frac{e^t - 1}{t^3} = \lim_{t \rightarrow 0} \frac{e^t}{3t^2} = \infty$$

$$21. \lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$$

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

$$17. \lim_{x \rightarrow 0^+} \frac{\ln x}{x} \rightarrow -\infty = -\infty$$



$$\begin{aligned} 19. \lim_{x \rightarrow \infty} \frac{e^x}{x^3} &= \lim_{x \rightarrow \infty} \frac{e^x}{3x^2} \\ &= \lim_{x \rightarrow \infty} \frac{e^x}{6x} = \lim_{x \rightarrow \infty} \frac{e^x}{6} = \infty \end{aligned}$$

$$26. \lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$$

$$25. \lim_{t \rightarrow 0} \frac{5^t - 3^t}{t}$$

$$= \lim_{t \rightarrow 0} \frac{5^t \ln 5 - 3^t \ln 3}{1} = \ln 5 - \ln 3$$

$$= \ln\left(\frac{5}{3}\right)$$

$$40. \lim_{x \rightarrow -\infty} x^2 e^x = \lim_{x \rightarrow \infty} (-x)^2 e^{-x}$$

$$= \lim_{x \rightarrow \infty} \frac{(-x)^2}{e^x} = \lim_{x \rightarrow \infty} \frac{2(-x)(-1)}{e^x}$$

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

$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x = k$$

$$\left(1 + \frac{1}{x}\right)^x = k$$

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