

Quiz 18

$$1. \lim_{x \rightarrow 3} \frac{x^2 - 9}{x^3 - 3x^2} \stackrel{0/0}{=} \lim_{x \rightarrow 3} \frac{2x}{3x^2 - 6x} = \frac{6}{9} = \frac{2}{3}$$

$$2. \lim_{x \rightarrow 0} \frac{\cos 3x - 1}{x^2} \stackrel{0}{=} \lim_{x \rightarrow 0} \frac{-3 \sin 3x}{2x} \stackrel{0}{=} \lim_{x \rightarrow 0} \frac{-9 \cos 3x}{2} = -\frac{9}{2}$$

$$\lim_{x \rightarrow 0} \frac{-9 \cos 3x}{2} = -\frac{9}{2}$$

$$3. L = \lim_{x \rightarrow \infty} \left(1 - \frac{2}{x}\right)^x \Rightarrow$$

$$\ln L = \lim_{x \rightarrow \infty} x \ln \left(1 - \frac{2}{x}\right) = \lim_{x \rightarrow \infty} \frac{\ln \left(1 - \frac{2}{x}\right)}{\left(\frac{1}{x}\right)} \stackrel{0}{=} \lim_{x \rightarrow \infty} \frac{\frac{1}{\left(1 - \frac{2}{x}\right)^2} \cdot \frac{2}{x^2}}{-\frac{1}{x^2}}$$

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