

Evaluate

$$\lim_{x \rightarrow \infty} x^3 e^{-x^2}$$

$$\lim_{x \rightarrow \infty} x^3 e^{-x^2} \quad \infty(0)$$

$$\lim_{x \rightarrow \infty} \frac{\frac{d}{dx}[x^3]}{\frac{d}{dx}[e^{-x^2}]} \quad \frac{\infty}{\infty}$$

$$\lim_{x \rightarrow \infty} \frac{3x^2}{2xe^{x^2}}$$

$$\lim_{x \rightarrow \infty} \frac{\frac{d}{dx}[3x]}{\frac{d}{dx}[2e^{x^2}]} \quad \frac{\infty}{\infty}$$

$$\lim_{x \rightarrow \infty} \frac{3}{4xe^{x^2}}$$

$$= 0$$

Evaluate

$$\lim_{x \rightarrow 0} (1-2x)^{\frac{1}{x}}$$

$$\lim_{x \rightarrow 0} (1-2x)^{\frac{1}{x}} \quad 1^{\infty}$$

$$\ln y = \lim_{x \rightarrow 0} \ln(1-2x)^{\frac{1}{x}}$$

$$\ln y = \lim_{x \rightarrow 0} \frac{1}{x} \cdot \ln(1-2x) \quad \frac{0}{0}$$

$$\ln y = \lim_{x \rightarrow 0} \frac{\frac{d}{dx}[\ln(1-2x)]}{\frac{d}{dx}[x]}$$

$$\ln y = \lim_{x \rightarrow 0} \frac{1}{1-2x} \cdot (-2)$$

$$\ln y = \lim_{x \rightarrow 0} \frac{-2}{1-2x}$$

$$\ln y = \frac{-2}{1-2(0)}$$

$$\ln y = -2$$

$$y = e^{-2} = \frac{1}{e^2}$$