

Eskimos Limits:

1) $\lim_{x \rightarrow -2} \frac{2x+2}{x^2+4x+3} = \frac{2(x+1)}{(x+3)(x+1)} = \frac{2}{x+3} = \frac{2}{-1} = -2$

2) $\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$ L'H: $\frac{\cos x - 1}{3x^2}$

L'H: $\frac{-\sin x}{6x}$ L'H: $\frac{-\cos x}{6} = -\frac{1}{6}$

3) $\lim_{x \rightarrow \infty} x e^{-x} = \frac{x}{e^x} = 0$

4) $\lim_{x \rightarrow 0} \frac{x \sin x}{\cos x - 1}$ L'H: $\frac{x \cos x + \sin x}{-\sin x}$

L'H: $\frac{x(-\sin x) + \cos x + \cos x}{-\cos x} = -2$

5) $\lim_{x \rightarrow -\infty} \frac{x+2}{x^2-x-6} = \frac{\cancel{x+2}}{(x-3)\cancel{(x+2)}} = \frac{1}{x-3} = 0$

6) $\lim_{x \rightarrow 0^+} \left(\frac{1}{x}\right)^x$ $\ln y = \lim_{x \rightarrow 0^+} x \ln\left(\frac{1}{x}\right)$

$y = \lim_{x \rightarrow 0^+} \left(\frac{1}{x}\right)^x$

$\lim_{x \rightarrow 0^+} \frac{\ln\left(\frac{1}{x}\right)}{\frac{1}{x}}$

L'H: $\frac{x \cdot -\frac{1}{x^2}}{-\frac{1}{x^2}}$

$\ln y = 0$
 $e^0 = 1$

$$7) \lim_{x \rightarrow 0^+} x \ln x = \lim_{x \rightarrow 0^+} \frac{\ln x}{\frac{1}{x}} \quad \text{L'H: } \frac{\frac{1}{x}}{-\frac{1}{x^2}}$$

$$= \frac{1}{x} \cdot \frac{-x^2}{1} = -x = 0$$

$$8) \lim_{x \rightarrow 1} \frac{\sin \pi x}{x-1} \quad \text{L'H: } \pi \cos \pi x = -\pi$$

$$9) \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$$

$$R \quad \ln y = \lim_{x \rightarrow \infty} x \ln \left(1 + \frac{1}{x}\right)$$

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

$$\frac{\frac{1}{1 + \frac{1}{x}} \cdot \frac{-1}{x^2}}{\frac{-1}{x^2}}$$

$$\ln y = 1$$

$$y = e$$

$$10) \lim_{x \rightarrow 1} \frac{\ln x}{x^2} = 0$$

$$11) \lim_{x \rightarrow 0^+} \frac{\ln x}{\cot x} \quad \text{L'H: } \frac{\frac{1}{x}}{-\csc^2 x} = \frac{\frac{1}{x}}{\frac{-1}{\sin^2 x}} = \frac{-(\sin x)^2}{x}$$

$$-2 \sin x \cdot \cos x = 0$$

$$12) \lim_{x \rightarrow 1} \frac{\sqrt{x}-1}{x-1} \quad \text{L'H: } \frac{\frac{1}{2\sqrt{x}}}{1} = \frac{1}{2}$$

$$\lim_{x \rightarrow \infty} (\sqrt{x^2+1} - x) = x \left(\frac{\sqrt{x^2+1}}{x} - 1 \right)$$

$$\frac{\frac{\sqrt{x^2+1}}{x} - 1}{\frac{1}{x}}$$

14) $\lim_{x \rightarrow 0} \frac{3e^x - 3}{x}$

0 L'H: $\lim_{x \rightarrow 0} 3e^x = 3$

L'H: $\frac{x \left(\frac{x}{\sqrt{x^2+1}} \right) - \sqrt{x^2+1}}{x^2}$

$$\frac{-\frac{1}{x^2}}{x^2}$$

15) $\lim_{x \rightarrow \infty} \frac{x^3}{e^x} = 0$

H

$$\lim_{x \rightarrow \infty} \frac{\frac{x^2}{\sqrt{x^2+1}} - \sqrt{x^2+1}}{x^2} \cdot \frac{-x^2}{1}$$

$$\frac{-x^2}{\sqrt{x^2+1}} + \sqrt{x^2+1}$$

$$\frac{-x^2 + x^2 + 1}{\sqrt{x^2+1}}$$

16) $\lim_{x \rightarrow 0^+} \left(\ln x + \frac{1}{x} \right)$
 $-\infty + 0 = -\infty$

$$\lim_{x \rightarrow \infty} \frac{1}{\sqrt{x^2+1}} = 0$$