Inf - inf

Exp) Evaluate $\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{\sin x}\right)$

$$\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{\sin x}\right) \overset{\text{"DSP"}}{=} \underbrace{\frac{1}{0^+}-\frac{1}{\sin 0^+}}_{} = \underbrace{\boxed{\infty-\infty}}_{\text{indet. form}}$$

(sinx) (x)

$\sin 0 = 0$

$$\lim_{x\to 0^+}\left(\frac{\sin x - x}{x\cdot \sin x}\right) \overset{\text{"DSP"}}{=} \text{"}\frac{0}{0}\text{"}$$

$$\underbrace{\text{"}\frac{0}{0}\text{"} \qquad \text{"}\frac{\infty}{\infty}\text{"}}_{\text{L.R.}}$$

$$\overset{H}{=} \lim_{x\to 0^+}\left(\frac{\cos x - 1}{\underbrace{1\cdot\sin x + x\cdot\cos x}}\right) \overset{DSP}{=} \frac{\cos 0 - 1}{\underbrace{\sin 0}_{0} + 0\cdot\underbrace{\cos 0}_{1}} = \text{"}\frac{0}{0}\text{"}$$

$$\overset{H}{=} \lim_{x\to 0^+}\left(\frac{-\sin x}{\cos x + \underbrace{1\cdot\cos x + x\cdot(-\sin x)}_{(x\cdot\cos x)'}}\right) \overset{\text{"DSP"}}{=} \frac{0}{1+1+0} = \frac{0}{2} = 0$$

$$\boxed{\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{\sin x}\right) = 0}$$