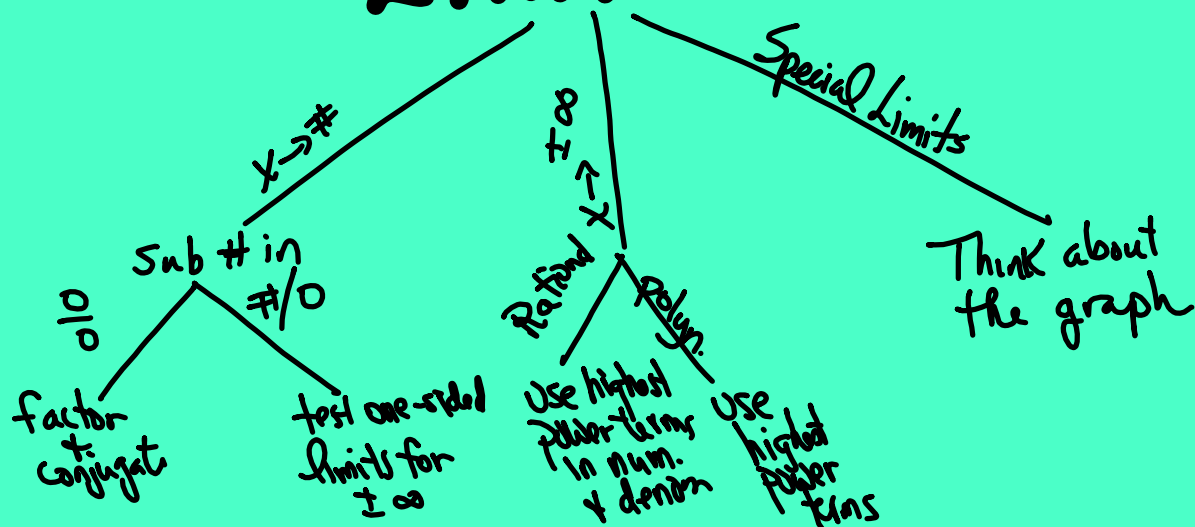


LIMITS



Special Limits

$$\lim_{x \rightarrow 0} \frac{\sin(nx)}{nx} = 1$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos(nx)}{nx} = 0$$

$$\lim_{x \rightarrow 0} \frac{1}{3} (1 - \cos(4x))$$

$$x \rightarrow 0 \quad \frac{1}{3} \cdot 12x$$

$$\frac{1}{3} \lim_{x \rightarrow 0} \frac{1 - \cos(4x)}{4x}$$

$$\frac{1}{3} \cdot 0 = \boxed{0}$$

$$\checkmark \lim_{x \rightarrow 0} \frac{2 \sin(50x)}{2 \cdot 25x}$$

$$2 \cdot \lim_{x \rightarrow 0} \frac{\sin(50x)}{50x}$$

$$= 2 \cdot 1$$

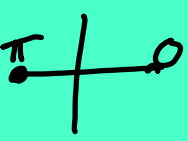
$$= \boxed{2}$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{x} \sin(44x)}{\frac{1}{x} \sin(88x)}$$

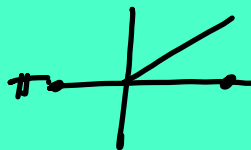
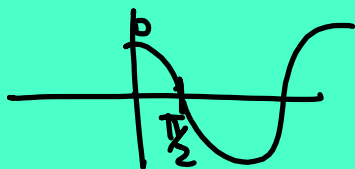
$$\lim_{x \rightarrow 0} \frac{\frac{44 \cdot \sin(44x)}{44 \cdot x}}{\frac{88 \cdot \sin(88x)}{88 \cdot x}}$$

$$\frac{44}{88} \lim_{x \rightarrow 0} \frac{\frac{\sin(44x)}{44x}}{\frac{\sin(88x)}{88x}}$$

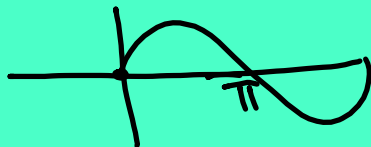
$$= \frac{1}{2} \cdot \frac{1}{1} = \boxed{\frac{1}{2}}$$

$$\lim_{x \rightarrow \pi^+} \sec x = \lim_{x \rightarrow \pi^+} \frac{1}{\cos x} = \frac{1}{\cos \pi} = \frac{1}{-1} = -1$$


$$\lim_{x \rightarrow \frac{\pi}{2}^-} \sec x = \sec \frac{\pi}{2} = \frac{1}{\cos \frac{\pi}{2}} = \frac{1}{0} = +\infty$$



$$\lim_{x \rightarrow \frac{1}{2}^+} \frac{\cos^{-1} x}{\sin(2\pi x)} = \frac{\cos^{-1}(1/2)}{\sin(2\pi \cdot \frac{1}{2})} = \frac{\pi/3}{0} = \frac{+}{-} = -\infty$$

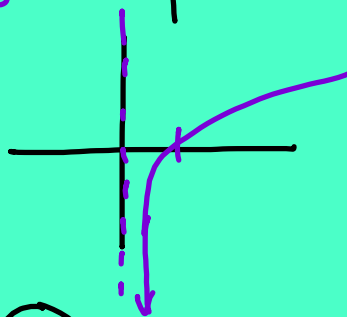
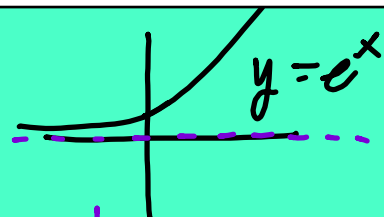


$$\lim_{x \rightarrow -\infty} e^x = 0$$

$$\lim_{x \rightarrow +\infty} e^x = +\infty$$

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

$$\lim_{x \rightarrow +\infty} \ln x = +\infty$$



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

$$\begin{aligned} \lim_{x \rightarrow \frac{\pi}{4}^+} \ln(1 - \tan x) &= \ln(1 - \tan(\frac{\pi}{4})) \\ &= \ln(1 - 1) \\ &= \ln 0 \\ &= -\infty \end{aligned}$$