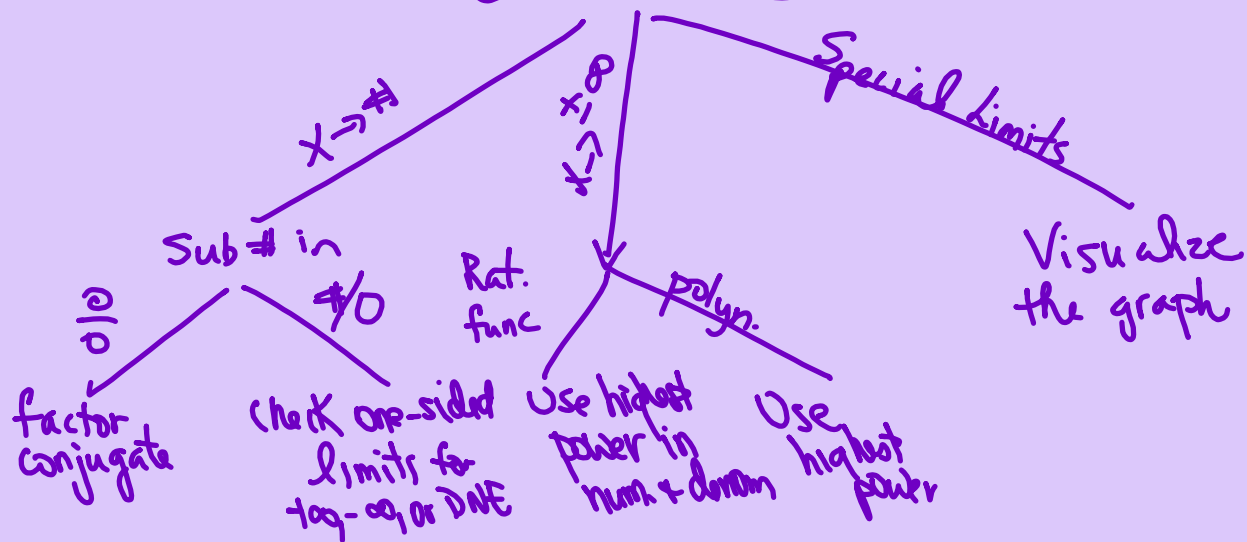


LIMITS



Special Limits

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

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

$$\lim_{x \rightarrow 0} \frac{3 \cdot \frac{1 - \cos(12x)}{3 \cdot 4x}}{3 \cdot 4x}$$

$$3 \lim_{x \rightarrow 0} \frac{\cos(12x) - 1}{12x}$$

$$= 3 \cdot 0$$

$$= 0$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{x} \sin(5x)}{\frac{1}{x} \sin(15x)} = \frac{0}{0}$$

$$\lim_{x \rightarrow 0} \frac{\frac{5}{5} \cdot \frac{\sin(5x)}{x}}{\frac{15}{15} \cdot \frac{\sin(15x)}{x}}$$

$$\lim_{x \rightarrow 0} \frac{5 \cdot \frac{\sin(5x)}{5x}}{15 \cdot \frac{\sin(15x)}{15x}}$$

$$\frac{5}{15} \lim_{x \rightarrow 0} \frac{\frac{\sin(5x)}{5x}}{\frac{\sin(15x)}{15x}}$$

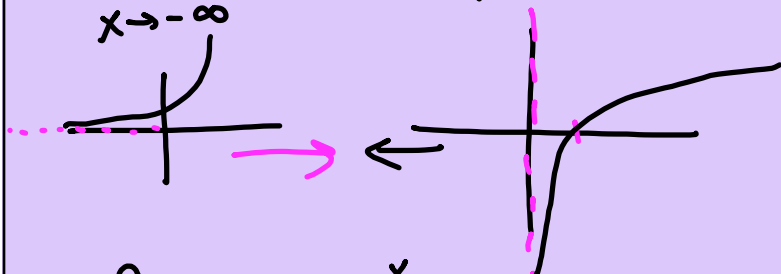
$$\frac{5}{15} \cdot \frac{1}{1} = \left(\frac{1}{3} \right)$$

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

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

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

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



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

$$\lim_{x \rightarrow \frac{\pi}{4}^+} \ln(1 - \tan x) = \ln(1 - \tan \frac{\pi}{4})$$

$$\ln(1 - 1)$$

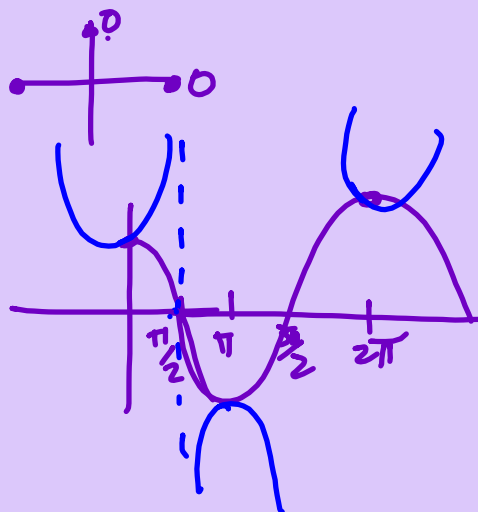
$$\ln(-0.1)$$

$$= \text{DNE}$$



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

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



$$\lim_{x \rightarrow \frac{1}{2}^+} \frac{\cos^{-1} x}{\sin(2\pi x)}$$

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

$$\frac{\sin(2\pi \cdot \frac{3}{4})}{\sin(\frac{3\pi}{2})}$$

$$\therefore \frac{3\pi/2}{1}$$

$$\lim_{x \rightarrow 6} \frac{2x}{(x-6)^3} = \frac{12}{0}$$

$$\lim_{x \rightarrow 6^-}$$

$$\lim_{x \rightarrow 6^+}$$