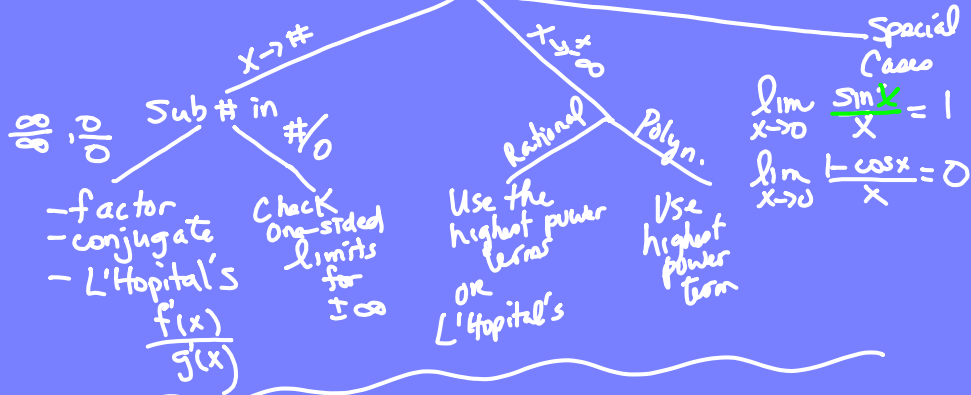


SEMESTER REVIEW

LIMIT TREE



$$\lim_{x \rightarrow -\infty} \frac{\sqrt{3+16x^2}}{5-2x}$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt[3]{16x^2}}{-2x}$$

$$\lim_{x \rightarrow -\infty} \frac{4|x|}{-2x}$$

$$\lim_{x \rightarrow -\infty} \frac{-4x}{-2x} = \boxed{2}$$

L'Hopital's

$$\lim_{x \rightarrow -\infty} \frac{\frac{1}{2}(3+16x^2)^{-1/2} \cdot 16x}{-2}$$

$$\lim_{x \rightarrow -\infty} \frac{-8x}{\sqrt{3+16x^2}} = \frac{\infty}{\infty}$$

$$\lim_{x \rightarrow -\infty} \frac{-8}{\frac{1}{2}(3+16x^2)^{-1/2} \cdot 32x}$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{3+16x^2}}{-2x}$$

L'Hopital's
 $0 \cdot \infty, \infty - \infty, 0^0, 1^\infty, \infty^0$

$$\lim_{x \rightarrow 0^+} (\cos x)^{1/x} = 1^\infty$$

$$\lim_{x \rightarrow 0^+} e^{\ln(\cos x) \cdot (1/x)}$$

$$\lim_{x \rightarrow 0^+} \frac{\ln(\cos x)}{x} = \frac{0}{0}$$

$$\lim_{x \rightarrow 0^+} \frac{1/\cos x \cdot -\sin x}{1}$$

$$\lim_{x \rightarrow 0^+} \frac{-\sin x}{\cos x} = \frac{0}{1} = 0$$

$$e^0 = 1$$

$$\lim_{x \rightarrow 0} (\sin x)^{\tan x}$$

$$\lim_{x \rightarrow 0} \tan x \cdot \ln(\sin x)$$

$$\lim_{x \rightarrow 0} \frac{\ln(\sin x)}{\cot x}$$

Guaranteed

- 1) What does a derivative represent?
- 2) Write two def. of derivative:

$$\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} \quad \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

* 6 derivatives of trig func.

$$\frac{d}{dx} e^x = e^x \quad \frac{d}{dx} a^x = \ln a \cdot a^x$$

$$\frac{d}{dx} \ln x = \frac{1}{x}$$

$$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}} \quad \frac{d}{dx} \tan^{-1} x = \frac{1}{x^2+1}$$

$$\frac{d}{dx} \sec^{-1} x = \frac{1}{|x|\sqrt{x^2-1}}$$

Find $f'(x)$. $f(x) = x^{3x^2} = e^{\ln x^{3x^2}} = e^{3x^2 \cdot \ln x}$

$$f'(x) = e^{3x^2 \cdot \ln x} \cdot \left[3x^2 \cdot \frac{1}{x} + \ln x \cdot 6x \right]$$

$$= 3x^2 \cdot x^{3x^2} \cdot [1 + 2 \ln x]$$

$$= 3x^{3x^2+1} [1 + 2 \ln x]$$