* these are not comprehensive, just a starting point, add to it what you like *

Midterm notes

Limits Involving ∞

① If degree of num. > degree of denom. no horizontal asym.
② degree num = degree of den. $y = \frac{\text{leading coeff of num}}{\text{leading coeff of denom.}}$
③ degree num < degree of denom. $y=0$

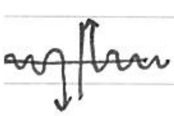
Guidelines to splitting limits

Never: ① $0 \cdot \infty$
② dne $\cdot$ dne

dne $\cdot$ a limit that does exist = dne
$0 \cdot \underset{\uparrow \text{ but is bounded}}{\text{dne}} = 0$

$\lim_{x \to 0} \frac{\sin x}{x} = 1$ $\lim_{x \to \infty} \frac{\sin x}{x} = 0$

$\lim_{x \to 0} \frac{\tan x}{x} = 1$ $\lim_{x \to \infty} \frac{\tan x}{x}$ dne



$\lim_{x \to 0} \frac{\cos x}{x}$ = dne $\lim_{x \to \infty} \frac{\cos x}{x} = 0$

$$\lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h} = f'(x_0)$$

$d/dx\,[\sin x] = \cos x$
$d/dx\,[\cos x] = -\sin x$
$d/dx\,[\tan x] = \sec^2 x$
$d/dx\,[\csc x] = -\cot x \csc x$
$d/dx\,[\sec x] = \tan x \sec x$
$d/dx\,[\cot x] = -\csc^2 x$

with respect to x

nDeriv(Y_1, X, X) at every x

find derivative of

$\frac{d}{dx} e^x = e^x$ $\qquad$ $\frac{d}{dx} e^u = e^u \frac{du}{dx}$

$\frac{d}{dx} \ln x = \frac{1}{x}$ $\qquad$ $\frac{d}{dx} \ln u = \frac{1}{u} \frac{du}{dx}$

$\frac{d}{dx} a^u = a^u \ln a \frac{du}{dx}$

$\frac{d}{dx} \log_a u = \frac{1}{u \ln a} \cdot \frac{du}{dx}$

* If f and g are inverses, then $g'(y) = \frac{1}{f'(x)}$

$\frac{d}{dx}[\sin^{-1} u] = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$

$\frac{d}{dx}[\cos^{-1} u] = -\frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$

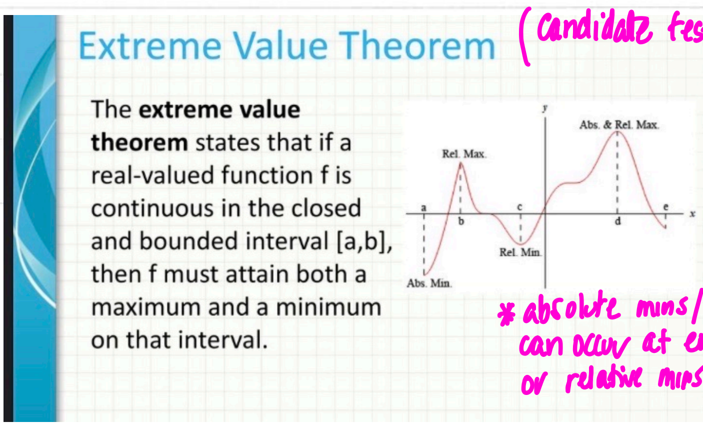
$\frac{d}{dx}[\tan^{-1} u] = \frac{1}{u^2+1} \frac{du}{dx}$

MVT

continuous on [a,b]

differentiable on (a,b)

$f'(c) = \frac{f(b)-f(a)}{b-a}$



(candidate test)

* absolute mins/maxs can occur at endpts or relative mins/maxs