Calculus Flash Card Review

The front of the card will be shown by a blue slide.

The answer will be represented by a red slide.

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

First derivative from difference quotient

$$\lim_{x \to 0} \frac{\sin x}{x}$$

1

$$\lim_{x \to 0} \frac{1 - \cos x}{x}$$

0

$$\lim_{x \to 0} \frac{\tan x}{x}$$

1

$$|x| = \begin{cases} x, \\ -x, \end{cases}$$

$X \geq 0$

$x < 0$

$$\frac{df}{dx}(uv)$$

$$u \cdot dv + v \cdot du$$

(product rule)

$$\frac{df}{dx}\left(\frac{u}{v}\right)$$

$$\frac{v \cdot du - u \cdot dv}{v^2}$$

(quotient rule)

$$(f \circ g)'(x)$$

$$f'g(x) \cdot g'(x)$$

(chain rule)

$$\frac{d}{dx} x^n$$

$$n \cdot x^{n-1}$$

(power rule)

$$\frac{d}{dx} \ln u$$

$$\frac{1}{u}\frac{du}{dx}$$

$$\frac{d}{dx} a^u$$

$$a^u \cdot \ln a \cdot \frac{du}{dx}$$

$$\frac{d}{dx}\log_a u$$

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

$$\frac{d}{dx} \sin x$$

$$\cos x$$

$$\frac{d}{dx}\cos x$$

$$-\sin x$$

$$\frac{d}{dx} \tan x$$

$$\sec^2 x$$

$$\frac{d}{dx}\csc x$$

$$-\csc x \cot x$$

$$\frac{d}{dx}\sec x$$

$\sec x \tan x$

$$\frac{d}{dx}\cot x$$

$$-\csc^2 x$$

$$f' > 0$$

function increasing

$$f' = 0$$

or undefined

possible max/min

$$f' < 0$$

function decreasing

$$f'' > 0$$

concave up

$$f'' = 0$$

or undefined

possible point of inflection

$$f'' < 0$$

concave down

$$\int u^n du$$

$$\frac{u^{n+1}}{n+1} + c$$

$$\int u^{-1} du$$

$$\ln|u| + c$$

$$\int \frac{du}{1+u^2}$$

$$\tan^{-1} u + c$$

$$\int \frac{du}{\sqrt{1-u^2}}$$

$$\sin^{-1} u + c$$

$$\int -\frac{du}{\sqrt{1-u^2}}$$

$$\cos^{-1} u + c$$

$$\frac{d}{dx}\int_{a}^{u} f(t)\,dt$$

$$f(u)\frac{du}{dx}$$

Fundamental Theorem, Part I

$$\int_a^b f(x)\,dx$$

$$F(b) - F(a)$$

Fundamental Theorem, Part II

$$y = y_0 e^{kt}$$

Law of Exponential Change

$$\frac{1}{b-a}\int_{a}^{b} f(x)\,dx$$

Mean (Average) Value Theorem for Integrals

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

Mean Value Theorem

$$f \rightarrow f' \rightarrow f''$$

$$position \rightarrow velocity \rightarrow acceleration$$

DREDS (Related Rates)

Draw a diagram**,**
label **R**elated Rates**,**
Write an appropriate
Equation,
Differentiate both
sides, **S**ubstitute