Name: **Stuff You Must Know Cold – Cal AB**

Limits

Notation for:

Limit from the left of $f(x)$ as $x \to a$

Limit from the right of $f(x)$ as $x \to a$

$\lim_{x \to a} f(x)$ *exists if* :

=

Theorems:

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

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

Steps:

1.
2.
3.

Definition of Continuity:
A function is continuous at the point x=a if and only if:

1.
2.
3.

Intermediate Value Theorem

Extreme Value Theorem

Rolle's Theorem

Derivatives

Definition of Derivative

$\frac{d}{dx}(f(x)) =$

Alternate Form of Def. of Derivative

$\frac{d}{dx}(f(x)) \; at \; x = a$

Equation of a tangent line at x=a

Chain Rule

f(g(x))	

Product Rule

f · g	

Quotient Rule

$\frac{f}{g}$	

Curve Sketching and Analysis

Critical Points:

Increasing:
Decreasing:

Relative Min:

Relative Max:

Absolute Extrema:

Concave Up:

Concave Down:

Point of Inflection:

More Derivatives

Where u is a function of x and a is a constant

function	derivative
x^n	
sin u	
cos u	
tan u	
csc u	
sec u	
cot u	
arcsin u	
arccos u	
arctan u	
arccsc u	
arcsec u	
arccot u	
e^u	
ln u	
a^u	
$\log_a u$	

Derivative of an Inverse

(a,b) on f(x)
$g(x) = f^{-1}(x)$
$g'(b) =$

The Mean Value Theorem (derivatives)

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The Fundamental Theorem of Calculus

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

$F'(x) = f(x)$

Corollary to FTC

$\frac{d}{dx}\int_{h(x)}^{g(x)} f(t)dt =$

Mean Value Theorem for Integrals
(Average Value)

Other integration rules:

$\int x^n dx =$

$\int \tan u du =$

$\int \sec u du =$

$\int \csc u du =$

$\int \cot u du =$

$\int a^u du =$

Area between two curves:

Solids of Revolution
Disk Method

Washer Method

Distance, Velocity, and Acceleration
s(t) is the position function,
velocity =
acceleration =

speed =

Speed is increasing when

position=

Total distance

average velocity =

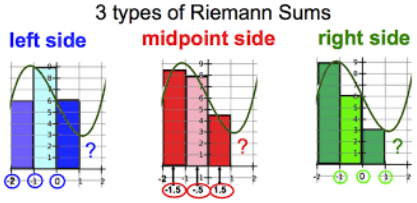
l'Hôpital's Rule :

Volumes of Known Cross Sections:

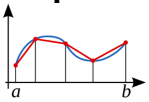
(Perpendicular to x-axis)

(Perpendicular to y-axis)
Squares:
Rectangles:
Equilateral Triangles:
Isosceles Right Triangles:
Semicircles:

Riemann Sums:



Trapezoidal Sum:



Area of a trapezoid:
$\left(\frac{f(c_1)+f(c_2)}{2}\right)(\Delta x)$

Limit definition of an Integral:

Area = $\int_a^b f(x)dx$ =

Trig Study Sheet

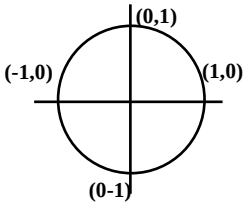
Signs: All Students Take Calculus

Values:

sin csc	All functions are positive
tan cot	cos sec

	30°	45°	60°
sin θ			
cos θ			
tan θ			

Quadrantals



(cos, sin)
tan = sin/cos

Trig Graphs:

y = sin x

y = cos x

y = tan x

Pythagorean Identities:

- **Reciprocal Identities:**
- **Double Angles:**