Name: ____________________ Know Cold for AB (Qtr 1 version)

Values of Trig Functions for Common Angles:

0°	$\sin\theta$	$\cos\theta$	$\tan\theta$
0			
π/6			
π/4			
π/3			
π/2			
π			

Careful with Trig Values: $\tan\left(\frac{3\pi}{4}\right) = -1$ but $\arctan(-1) = -\frac{\pi}{4}$

$\sin^2\theta + \cos^2\theta = 1$ $\quad 1 + \tan^2\theta = \sec^2\theta$ $\quad 1 + \cot^2\theta = \csc^2\theta$

$\sin^2\theta = \frac{1-\cos 2x}{2}$ $\quad \cos^2\theta = \frac{1+\cos 2x}{2}$

Limits

Limits to know:

$\lim\limits_{x\to 0}\frac{\sin x}{x} =$ $\quad \lim\limits_{x\to 0}\frac{1-\cos x}{x} =$ $\quad \lim\limits_{n\to\infty}\left(1+\frac{1}{n}\right)^n =$

Situations Limits Fail to Exist

1) Left side _________ Right side
2) Graph _______________
3) __________ behavior (such as ____)

Definition of Continuity:

A function is continuous at the point $x = c$ if and only if:

1) $f(c)$ is ____________________
2) __________ exists
3) __________ = __________

Intermediate Value Theorem

1) f must be _______________ on _______
2) k is between ______ and ______
3) ______ ≠ ______
4) Therefore, c must be between ______ and ______

Derivatives

FORMAL Definition of Derivative

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

Alternate Form of Definition of a Derivative

$\frac{d}{dx}(f(x))$ at $x = c$ is __________

Product Rule

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

Quotient Rule

$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) =$ ___________________________

Chain Rule

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

Situations Derivatives Fail to Exist

1) __________ turns or "_________"
2) ___________ Tangents
3) ______continuity

Derivatives

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

$\frac{d}{dx}(\sin u) =$ ________ $\quad \frac{d}{dx}(\csc u) =$ ________

$\frac{d}{dx}(\cos u) =$ ________ $\quad \frac{d}{dx}(\sec u) =$ ________

$\frac{d}{dx}(\tan u) =$ ________ $\quad \frac{d}{dx}(\cot u) =$ ________

$\frac{d}{dx}(e^u) =$ ________ $\quad \frac{d}{dx}(\ln u) =$ ________

$\frac{d}{dx}(a^u) =$ ________ $\quad \frac{d}{dx}(\log_a u) =$ ________

$(f^{-1})'(a) =$ ______________________________

$\frac{d}{dx}(\sin^{-1} u) =$ ______ $\quad \frac{d}{dx}(\csc^{-1} u) =$ ______

$\frac{d}{dx}(\cos^{-1} u) =$ ______ $\quad \frac{d}{dx}(\sec^{-1} u) =$ ______

$\frac{d}{dx}(\tan^{-1} u) =$ ______ $\quad \frac{d}{dx}(\cot^{-1} u) =$ ______

Curve Sketching and Analysis

Critical Values: $\frac{dy}{dx} =$ ____ *OR* __________

Absolute/Global Max or Min: __________ Tes
Must include the ________ and __________

Local/Relative Minimum

If ____ changes from ________ to ________

OR $\frac{d^2y}{dx^2}$ ☐ 0

Local/Relative Maximum

If ____ changes from ________ to ________

OR $\frac{d^2y}{dx^2}$ ☐ 0

Stuff You Must Know Cold for AP Test – Calculus AB (Rev 2015-16)

Point of Inflection

1) If ______ OR ______ does not exist **AND**

2) if $f''(x)$ changes from ________ to ________ or ________ to ________ **OR** if $f'(x)$ changes from ________ to ________ or ________ to ________

Extreme Value Theorem

If $f(x)$ is ___________ on $[a,b]$, then there exists a(n) _____________ on that interval.

The Mean Value Theorem (derivatives)
Slope of ________ = Slope of ________

__________ = ____________________

Particle Motion

Position = _______ Velocity = _____________

Speed = ________ Acceleration = ___________

[illegible] ____________

[illegible] ____________

Speed of object **increasing** when ___________ and ___________ have ________ signs

Speed of object **decreasing** when ___________ and ___________ have ________ signs

Natural Log Values

$\ln 1 =$ $\ln e =$

Integration

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

$\int \cos u \, du =$ __________ $\int \sin u \, du =$ __________

$\int \sec^2 u \, du =$ __________ $\int \csc^2 u \, du =$ __________

$\int \sec u \tan u \, du =$ __________ $\int \csc u \cot u \, du =$ __________

$\int \tan u \, du =$ __________ $\int \cot u \, du =$ __________

$\int \sec u \, du =$ __________ $\int \csc u \, du =$ __________

$\int \frac{du}{u} =$ __________ $\int e^u \, du =$ __________

$\int a^u \, du =$ __________ $\int \frac{du}{\sqrt{a^2-u^2}} =$ __________

$\int \frac{du}{a^2+u^2} =$ __________ $\int \frac{du}{u\sqrt{u^2-a^2}} =$ __________

Area Under The Curve (Trapezoids)

Riemann's Sum:

$\int_a^b f(x)dx =$ ____________________ or $A = bh$

Trapezoidal Sum:

$\int_a^b f(x)dx =$ ________________ or $A = \frac{h(b_1+b_2)}{2}$

1st Fundamental Theorem of Calculus

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

Average Value of $f(x)$ on $[a,b]$:

____

2nd Fundamental Theorem of Calculus

$\frac{d}{dx}\int_a^x f(t)dt =$ ________________

2nd Fundamental Theorem (Chain Rule):

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

Exponential Growth & Decay

General Solution for Exponential Growth

Solids of Revolution

Area between two curves: ________________

Disk Method: ________________________

Washer Method: ______________________

Volume by Cross Sections: ______________

Isosceles Triangle:

Squares:	Isosceles Triangle:
Semicircles:	Equilateral Triangle:

L'Hôpital's Rule:

If $\frac{f(a)}{g(b)} =$ —— *OR* ——,

then $\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a}$ ______