Calculus Midterm 2 Cheat Sheet
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Trigonometric Identities

$\sin^{2+\cos}2=1$	sec(x) = 1/cos(x)
cot(x) = 1/tan(x) OR cos(x)/sin(x)	tan(x) = sin(x)/cos(x)
csc(x) = 1/sin(x)	$\sec^{2 = \tan}2+1$

Graphing Steps

1. Domain
2. Intercepts
3. Asymptotes
4. Intervals of Increase and Decrease
5. Local Minimums and Maximums
6. Concavity and Inflection Points

Graphing Tips

VA: lim (x->+_infinity) f(x) =_+infinity (left and right)	HA: lim (x->+_infinity) f(x) = c at y=c
VA: Find by setting the denominator = 0 and solving for x	HA: y=0 if n<d, ax/bx if n=d, none if n>d
First Derivative: Intervals of increase or decrease + min/max	Second Derivative: Concavity + Inflection Points

Derivative Rules

Product: f'(x)g(x) + g'(x)f(x)	Chain: f'(g(x)) * g'(x)
Quotient: f'(x)g(x) - g'(x)f(x)/g(x)^2	

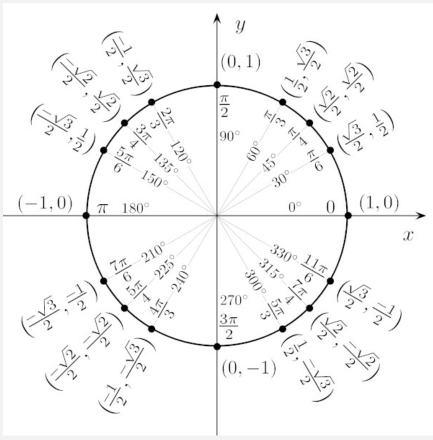
Acceleration and Velocity

Acceleration is the antiderivative of velocity	(come to stop) 1. Find antiderivative of function
2. Find v(0) or C and set = 0	(for distance) 1. Derivative, solve for t, derivative, plug in
To find t take derivative, to find distance take integral	

Evaluating Integrals

a+b/c = a/c + b/c	Indefinite: F(x) + C
F(b)-F(a) (find antiderivative and plug in)	

Unit Circle



Derivative Tests

1st: Positive to Negative: local max	2nd: f'(c) = 0 & f''(c)>0: local min & concave up
1st: Negative to Positive: local min	2nd: f'(c) = 0 & f''(c)<0: local max & concave down
Critical points when f'(x)=0	Inflection points when f''(x)=0

Intermediate Value Theorem

a<c<b	Used to find when f(x) has roots
When proving roots, show that one part is positive and the other is negative	To find c, set y=0 and solve for x
To show at most, show that there is 1 critical value and f(x) can only cross x amount of times	
Explain that you are using IVT	

Areas & Distances

Derivative: rate of change	Antiderivative: total change
n or change t = b-a/n	RHS: E (n i=1) f(ti) change t
LHS: E (n-1 i=0) f(ti) change t	ti = a +i change t

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U Subsitution

Step 1: Make a "u-subsititution" (let u=)
Step 2: Find du/dx
Step 3: Solve for dx
Step 4: Substitute dx and cancel out terms
Step 5: Integrate with respect to u
*If a definite integral, change the bounds from x bounds to u bounds
*Add C if a indefinite integral

Mean Value Theorem

Is continuous and differentiable	f(a)=f(b)
f'(c)=f(b)-f(a)/b-a	f'(c)=0
How large can this be?	
By MVT f'(c) =... for some c in [0,x]. Then do the math. Hence for every x in interval f(x) is whatever the math proves.	

Antiderivatives

Function	Antiderivative
x^n	x^n+1/n+1
cos(x)	sin(x)
sin(x)	-cos(x)
sec^2(x)	tan(x)
sec(x)tan(x)	sec(x)

Derivatives

Fucntion	Derivative
sin(x)	cos(x)
cos(x)	-sin(x)
tan(x)	sec^2(x)
csc(x)	-csc(x)
sec(x)	sec(x)tan(x)
cot(x)	-csc^2(x)

Optimization Problems

Usually using two different formulas (like volume and perimeter)	If maximizing volume, solve for one variable and plug that it
Next, solve for derivative and set = 0	After solving for that variable, plug into original (volume) equation
For distance: √(x-a)$^{2 + (y-b)}$2 & solve for critical point	
May need to prove that something is a global min/max	

Properties of the Definite Integral

Constant:
Addition:
Pulling a Constant:
Subtraction
Splitting