*Limit: What y is approaching** | *Slope* | *Area* | *Algebra 8 – 12* | *Logic!*

C12 - 0.0 - Methods Limits/Derivatives/Integrals

<u>Limits</u>
Extreme Table of Values
Substitution (if Continuous*)
Factoring/FOIL/Graphing

Conjugate Top/Bot/Both/FL*
Multiply by "1"
Fractions/Separate
Trig Identities

<u>LCD</u> Add Fractions top and bottom, flip and multiply. **OR**
Multiply top and bottom by LCD
(Complex Fractions)

<u>Horizontal Asymptotes</u>

*Divide top and bottom by x to the highest exponent of x in denominator

$\lim_{x \to +\infty} f(x) = \#$ OR $\lim_{x \to -\infty} f(x) = \#$

$HA: y = \#$

*Rationals

<u>Vertical Asymptotes</u>

*Denominator=0

$\lim_{x \to a^-} = \pm\infty$ OR $\lim_{x \to a^+} = \pm\infty$

$VA: x = a$

<u>Derivatives</u>

Definition of the Derivative

$$m = f'(a) = \boxed{f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}}$$

Alternatives!

$$m = f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

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

Can Sub x before simplification

$\frac{d}{dx}x^2$; Take derivative of x^2

Derivative Laws

Calc Math 8

Ln Both Sides

Staples!

$v_{inst} = p'(t)$ $\quad v_{ave} = \frac{p_2 - p_1}{t_2 - t_1}$ $\quad v(t) = \frac{d}{dt}p(t)$ $\quad a(t) = \frac{d}{dt}v(t)$

$$p(t) = \int v(t)dt + C$$

$$v(t) = \int a(t)dt + C$$

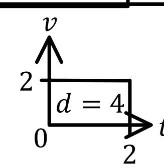
<u>FUNDAMENTAL THEOREM OF CALCULUS</u>

$$A = \int_a^b f(x)dx = F(b) - F(a)$$

F(x) is the antiderivative of f(x)

$$Average\ Value = \frac{1}{b-a}\int_a^b f(x)dx \quad [a, b]$$

$$v_{ave} = \frac{1}{2-0}\int_0^2 2dx = 2$$



$d = vt$

<u>Integration</u>
Geometry
Riemann Sum
RLM RAM
Trap Rule
Graphing TOV
symbolab.com

Indefinite +C - Anti
Definite - Integral - Anti
Integration Rules/Reverse Chain!
Algebra/Long Div/Comp Square
Exponent/Fraction Laws
Factoring/Distribution/Piecewise
U Substitution/Tricky*/+@#–@#..
Trigonometry ID's/Sub/Conj

Upper-Lower* - Domain!
Intersections!

Calc Math 9

Cylindrical Shells
$$V = 2\pi \int_a^b xy dx$$

Y-Land
Flip Page 90^0 CCW
Right to Left
Integration:
Parts, Partial Fractions
Trig Sub

<u>Distance vs Displacement!</u> $Distance = \int |f(x)| dx$ $\quad Displacement = \int f(x) dx$

Area Enclosed vs Integral!

$$A = \int (f_{upper} - g_{lower})\, dx$$

$$V = \pi \int (r_{outer}^2 - r_{inner}^2) dx$$

<u>Volume</u>

$$V = \int_a^b A(x)dx$$

$$V_{circles} = \pi \int (f(x))^2\, dx \qquad A = \pi r^2$$

$s, r = f(x)$

$$V_{squares} = \int (f(x))^2\, dx \qquad A = s^2$$

<u>FUNDAMENTAL THEOREM OF CALCULUS</u>

Definite Integral as a Net Change

$$F(b) = F(a) + \int_a^b f(x)\, dx$$

$$F(b) = F(0) + \int_0^b f(x)\, dx$$

$FTP1 + F(a)$