

# C12 - 0.0 - English Sentences

Chain Rule: Derivative of Outside function Times Derivative of Inside function  
Possibly do Chain Rule again...

<p><b>Power Rule:</b> Bring the exponent down in front (Of the variable, Multiply by Coefficient) Subtract one from the exponent</p>	<p><b>Power/Chain Rule:</b> Bring the exponent down in front Write what we are doing power rule on Subtract one from the exponent Multiply by the derivative of what you did the power rule on Possibly do Chain Rule again...</p>
<p><b>Product Rule:</b> Derivative of the first, times the second, Plus Derivative of the second times the first</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Switch: First with Top Second with Bottom Plus → Minus Over bottom squared</p> </div>
<p><b>Quotient Rule:</b> Derivative of the top, times the bottom, Minus Derivative of the bottom, times the top, All over bottom squared</p>	

**Equation of Tangent Line:**  
DERIVATIVE - Take the derivative of the equation  
SLOPE - Sub the X value of the point into the derivative to find the slope value  
Y - VALUE - Possibly Sub the X/Y value back into the original equation to figure out the Y/X value  
EQUATION - Write down the equation in slope point form or  $y = mx + b$  or gen form

$f'(a) = \text{slope } (x, y)$   
Tangent Equation

<p><b>Implicit Differentiation:</b> Derivative <span style="border: 1px solid black; padding: 2px;">Don't forget y'</span> Combine y' on one side Everything else on the other side Factor out y' Divide both sides Sometimes sub y and or y' back in Possibly sub (x,y) before isolating <u>Eq of Tan, don't need to isolate y'</u></p>	<p><b>Max/Min Critical Points:</b> Diagram (Label/Declare) Equation/s Substitute 1st Derivative = 0 Solve Number Line Check <math>f'(x) - \text{Slopes Inc/Dec}</math> <math>f(x) - \text{Points (CP's)}</math> Answer the Question Check End Points <b>Domain/Prime(s) Restrictions!</b></p>	<p><b>Inflection Points</b> Equation/s Substitute 2nd Derivative = 0 Solve Number Line Check <math>f''(x) - \text{Concavity}</math> <math>\text{Conc Up/Conc Down}</math> <math>f(x) - \text{Points (IP's)}</math> Answer the Question</p>
--	---	--

<p><b>Related Rates:</b> Draw a diagram Equation/Given/Find?/s Substitute Substitute Constants* Derivative/Chain <b>*Negative Derivatives</b> Answer the Question Units/Logic!</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">             Geometry/Trig Similar Triangles         </div>	<p><b>Integration:</b> Integrate Symbol &amp; dx →   Bar Sub in top Minus Sub in bottom</p>	<p><u>U Sub</u> Choose u du/dx, Isolate dx Sub dx &amp; u, Cancel Integrate, Either: -Sub back in u or, -change bar to u Sub Top-Bottom</p>	<p><b>Integration by u</b> Substitution Choose a "u" who's derivative is present, and cancels (possibly do Algebra)*</p>
--	---	---	--

<b>Squeeze Theorem</b>	$f(x) \leq g(x) \leq h(x)$	
<b>L'Hopital's Rule</b>	IF $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{0}{0}, \frac{\pm\infty}{\pm\infty}, 0 \times \infty, 0^0, \infty^0, \infty^0, \infty - \infty$	$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$
<b>Newton's Method</b>	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, n = 1, 2, 3 \dots$	<u>MVT</u> <span style="margin-left: 100px;"><u>IVT</u></span>
<b>Linear Approximation</b>	$L(x) = y_1 + m(x - x_1)$	$y' = \frac{y_2 - y_1}{x_2 - x_1}$ <span style="margin-left: 20px;"><math>f(a) \leq f(c) \leq f(b)</math> &amp; Continuous</span>