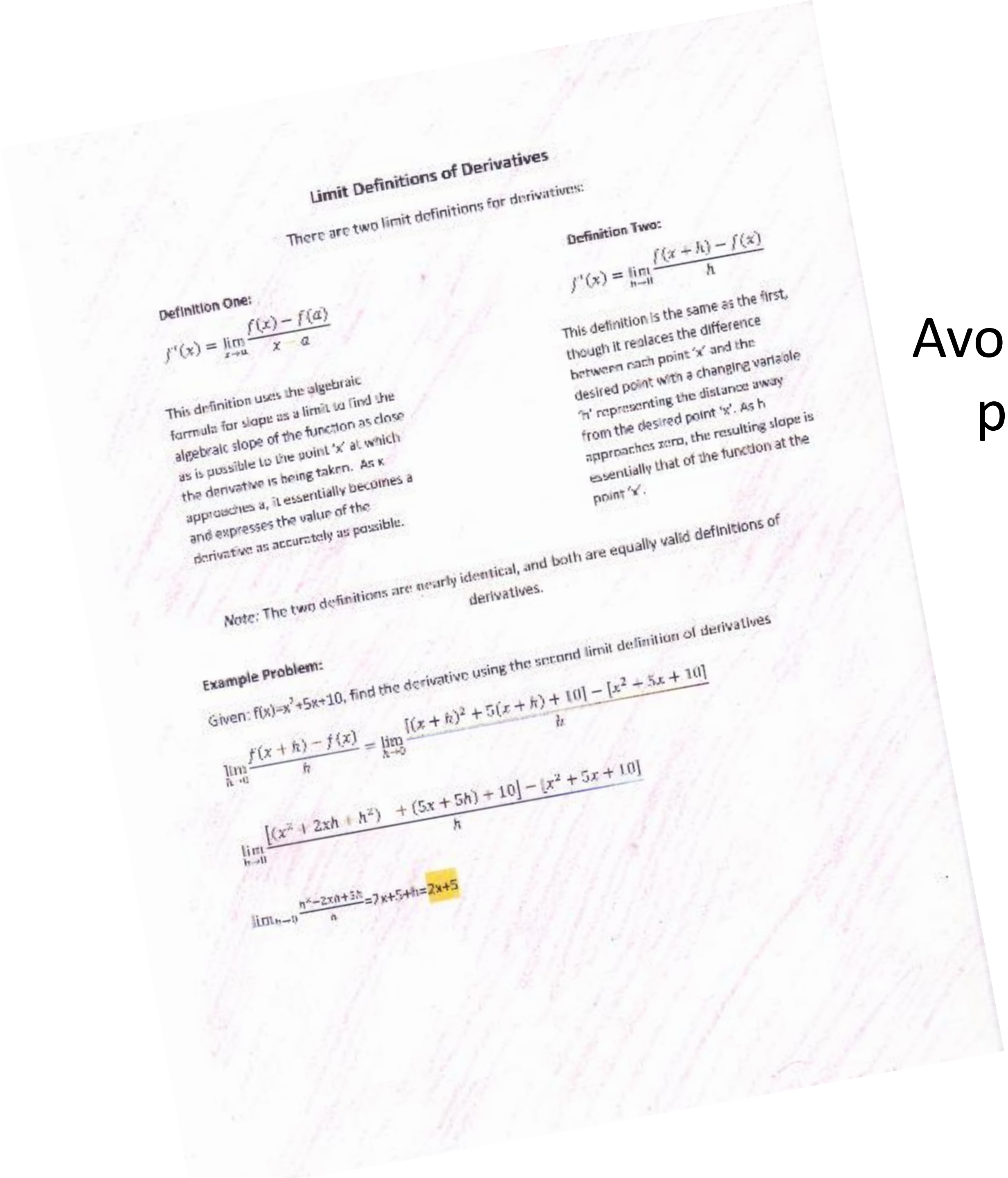
What to do and not to do

Scrapbook/Portfolio



Limit Definitions of Derivatives

There are two limit definitions for derivatives:

Definition One:

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

This definition uses the algebraic formula for slope as a limit to find the algebraic slope of the function as close as is possible to the point 'x' at which the derivative is being taken. As x approaches a, it essentially becomes a and expresses the value of the derivative as accurately as possible.

Definition Two:

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

This definition is the same as the first, though it replaces the difference between each point 'x' and the desired point with a changing variable 'h' representing the distance away from the desired point 'x'. As h approaches zero, the resulting slope is essentially that of the function at the point 'x'.

Note: The two definitions are nearly identical, and both are equally valid definitions of derivatives.

Example Problem:

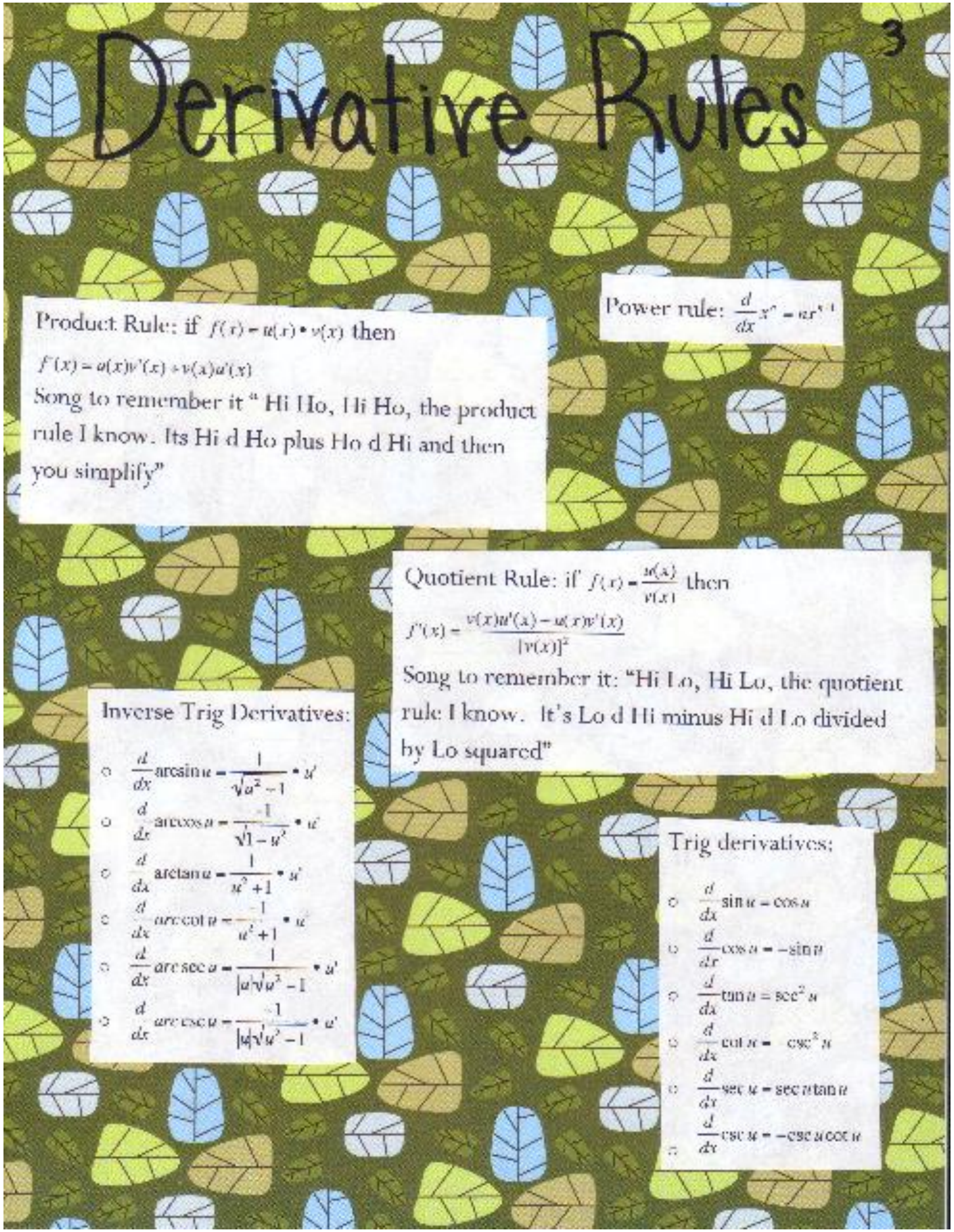
Given: $f(x)=x^2+5x+10$, find the derivative using the second limit definition of derivatives

$$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h} = \lim_{h\to 0}\frac{[(x+h)^2+5(x+h)+10]-[x^2+5x+10]}{h}$$

$$\lim_{h\to 0}\frac{[(x^2+2xh+h^2) \quad +(5x+5h)+10]-[x^2+5x+10]}{h}$$

$\lim_{h\to 0}\frac{h^2-2xh+5h}{h}=2x+5+h=$2x+5

Avoid a TEXTBOOK like presentation . . . .



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Derivative Rules

Power rule: $\frac{d}{dx}x^n = nx^{n-1}$

Product Rule: if $f(x) = u(x) \bullet v(x)$ then

$f'(x) = u(x)v'(x) + v(x)u'(x)$

Song to remember it " Hi Ho, Hi Ho, the product rule I know. Its Hi d Ho plus Ho d Hi and then you simplify"

Quotient Rule: if $f(x) = \frac{u(x)}{v(x)}$ then

$f'(x) = \frac{v(x)u'(x) - u(x)v'(x)}{[v(x)]^2}$

Song to remember it: "Hi Lo, Hi Lo, the quotient rule I know. It's Lo d Hi minus Hi d Lo divided by Lo squared"

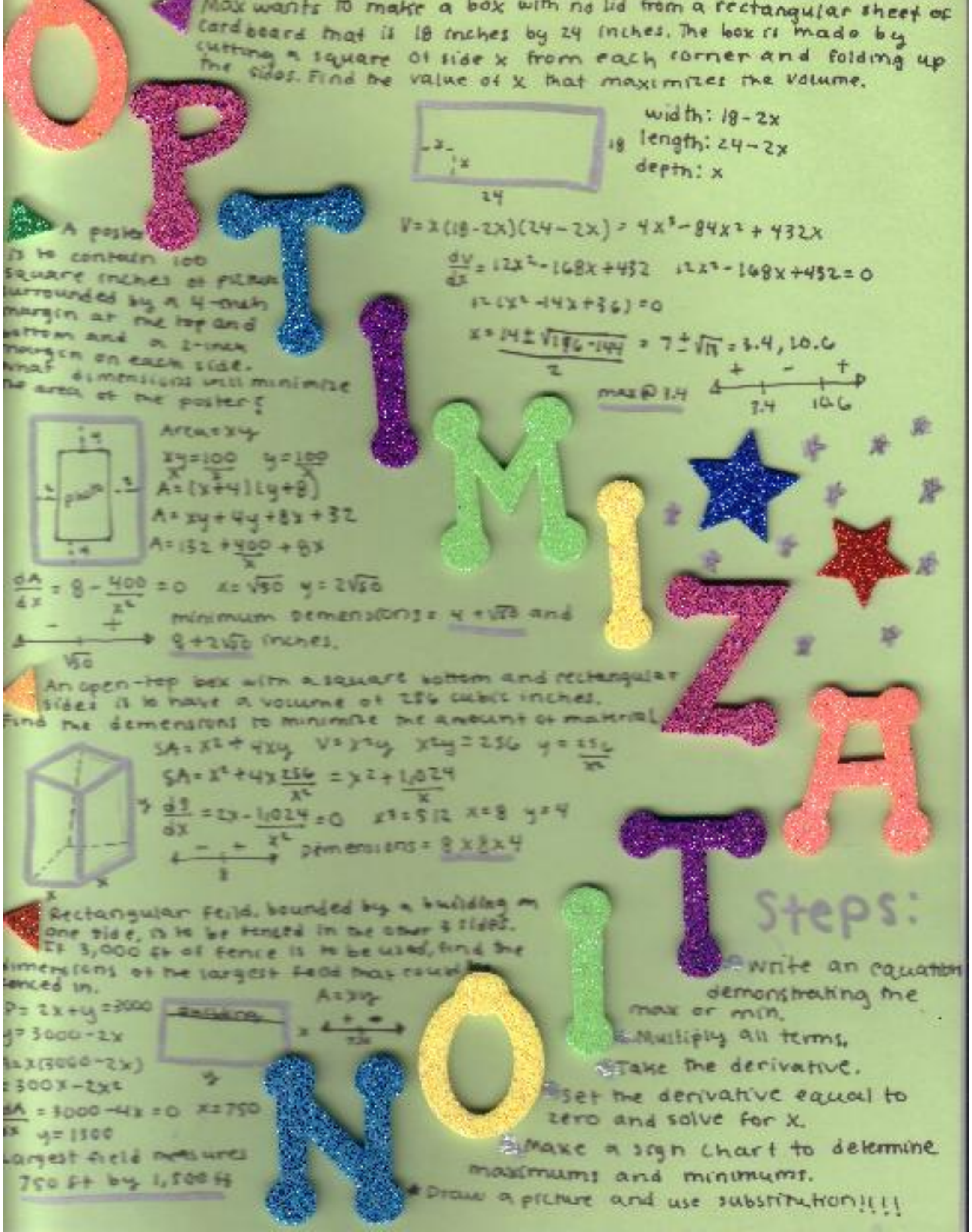
Inverse Trig Derivatives:

- $\frac{d}{dx}\arcsin u = \frac{1}{\sqrt{u^2-1}} \bullet u'$
- $\frac{d}{dx}\arccos u = \frac{-1}{\sqrt{1-u^2}} \bullet u'$
- $\frac{d}{dx}\arctan u = \frac{1}{u^2+1} \bullet u'$
- $\frac{d}{dx}\operatorname{arccot} u = \frac{-1}{u^2+1} \bullet u'$
- $\frac{d}{dx}\operatorname{arcsec} u = \frac{1}{|u|\sqrt{u^2-1}} \bullet u'$
- $\frac{d}{dx}\operatorname{arccsc} u = \frac{-1}{|u|\sqrt{u^2-1}} \bullet u'$

Trig derivatives:

- $\frac{d}{dx}\sin u = \cos u$
- $\frac{d}{dx}\cos u = -\sin u$
- $\frac{d}{dx}\tan u = \sec^2 u$
- $\frac{d}{dx}\cot u = -\csc^2 u$
- $\frac{d}{dx}\sec u = \sec u \tan u$
- $\frac{d}{dx}\csc u = -\csc u \cot u$

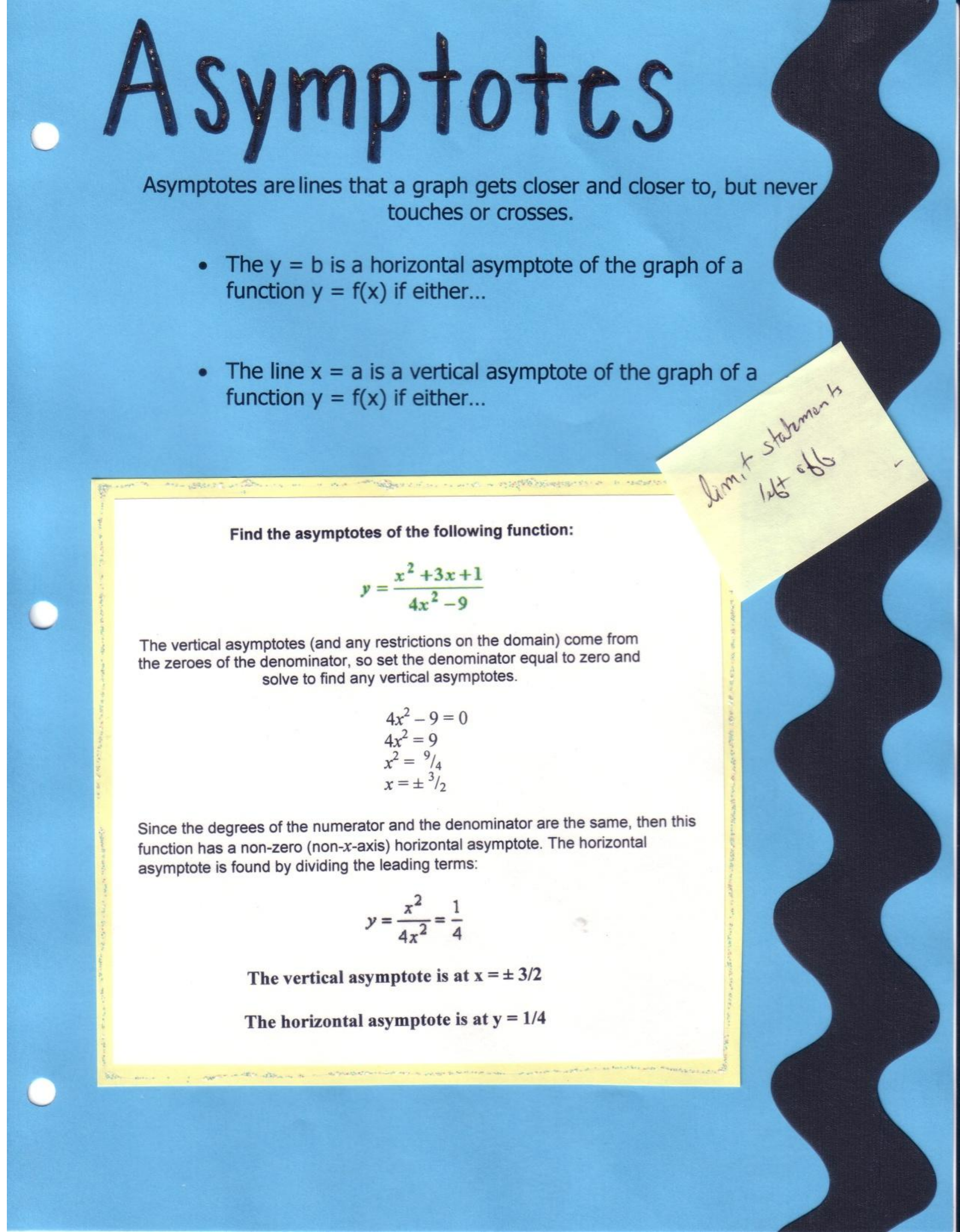
Pretty paper but still textbook like . . . .



A lot of work but still textbook like

One more. . . .
Neatly done BUT still textbook like

Can you tell that this is something to avoid?



Asymptotes

Asymptotes are lines that a graph gets closer and closer to, but never touches or crosses.

- The y = b is a horizontal asymptote of the graph of a function y = f(x) if either...
- The line x = a is a vertical asymptote of the graph of a function y = f(x) if either...

limit statements left off

Find the asymptotes of the following function:

$$y = \frac{x^2 + 3x + 1}{4x^2 - 9}$$

The vertical asymptotes (and any restrictions on the domain) come from the zeroes of the denominator, so set the denominator equal to zero and solve to find any vertical asymptotes.

$$4x^2 - 9 = 0$$
$$4x^2 = 9$$
$$x^2 = {}^9/_4$$
$$x = \pm {}^3/_2$$

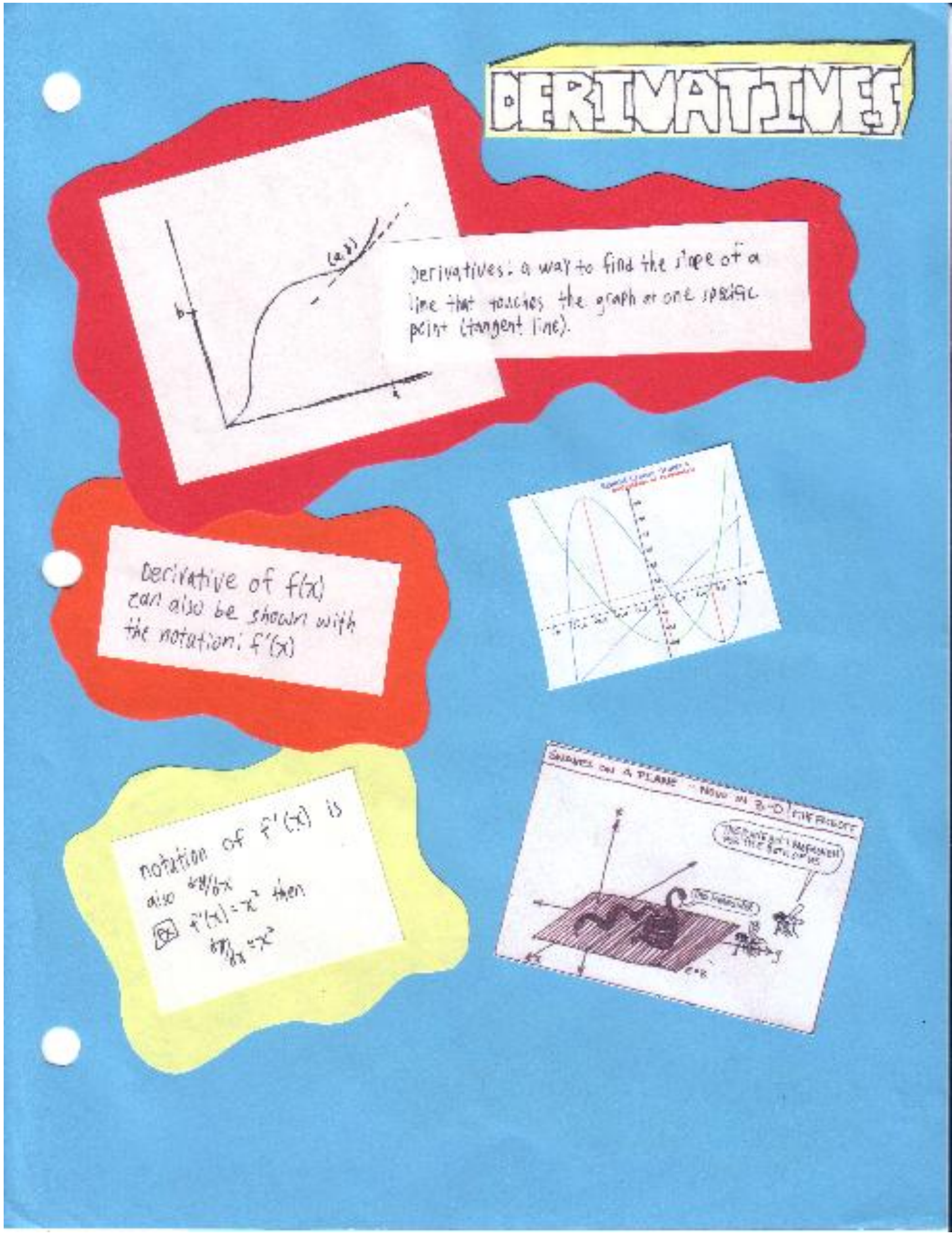
Since the degrees of the numerator and the denominator are the same, then this function has a non-zero (non-x-axis) horizontal asymptote. The horizontal asymptote is found by dividing the leading terms:

$$y = \frac{x^2}{4x^2} = \frac{1}{4}$$

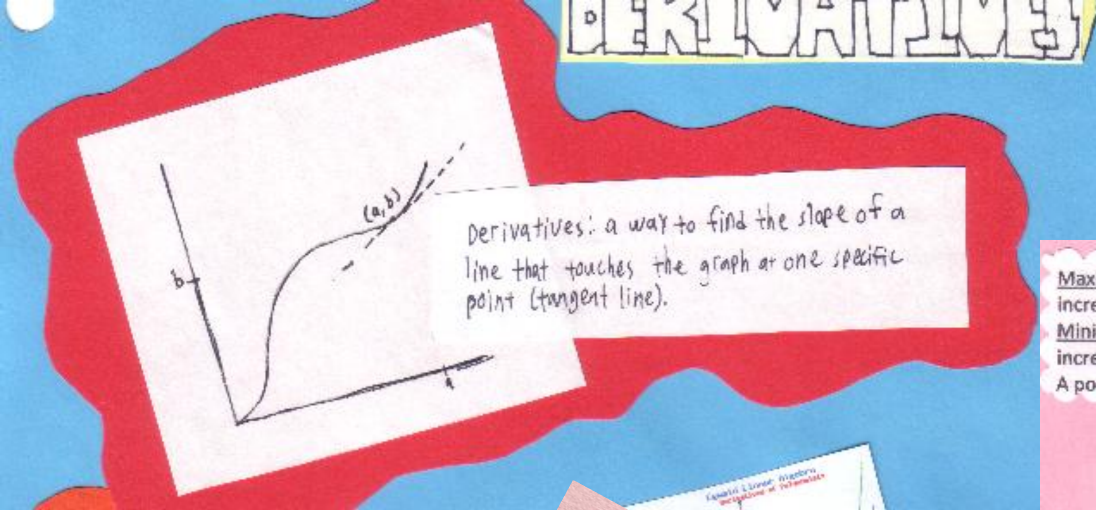
The vertical asymptote is at x = ± 3/2

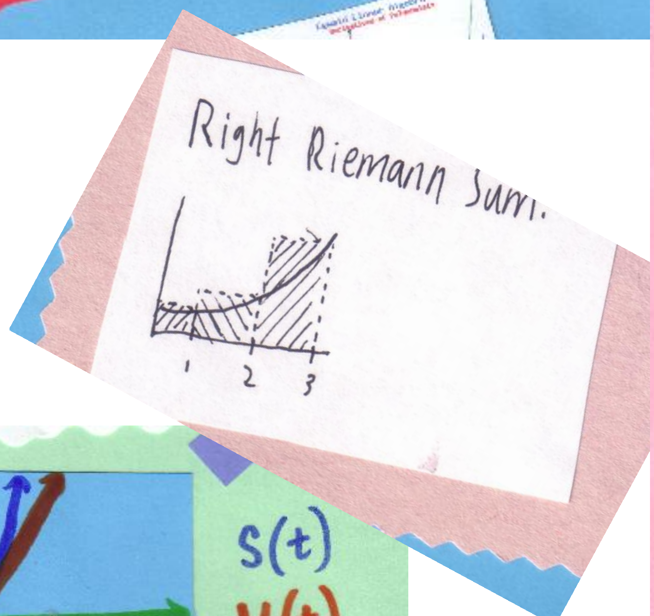
The horizontal asymptote is at y = 1/4

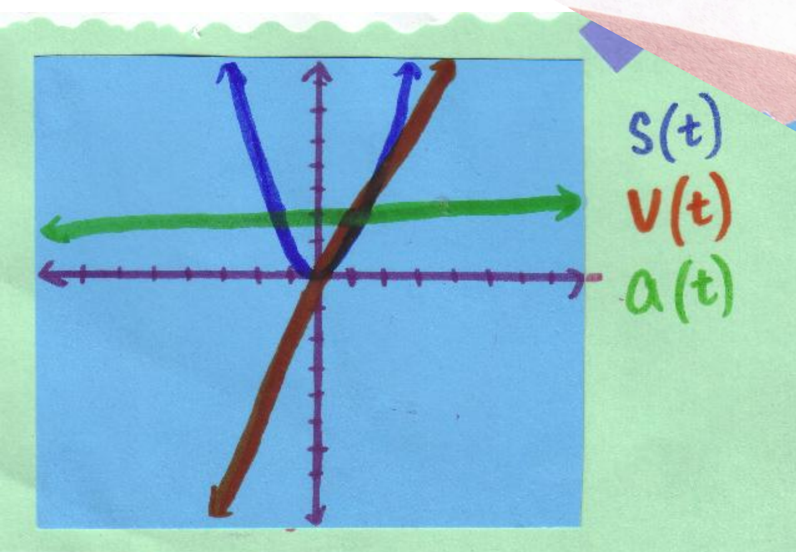
This is better

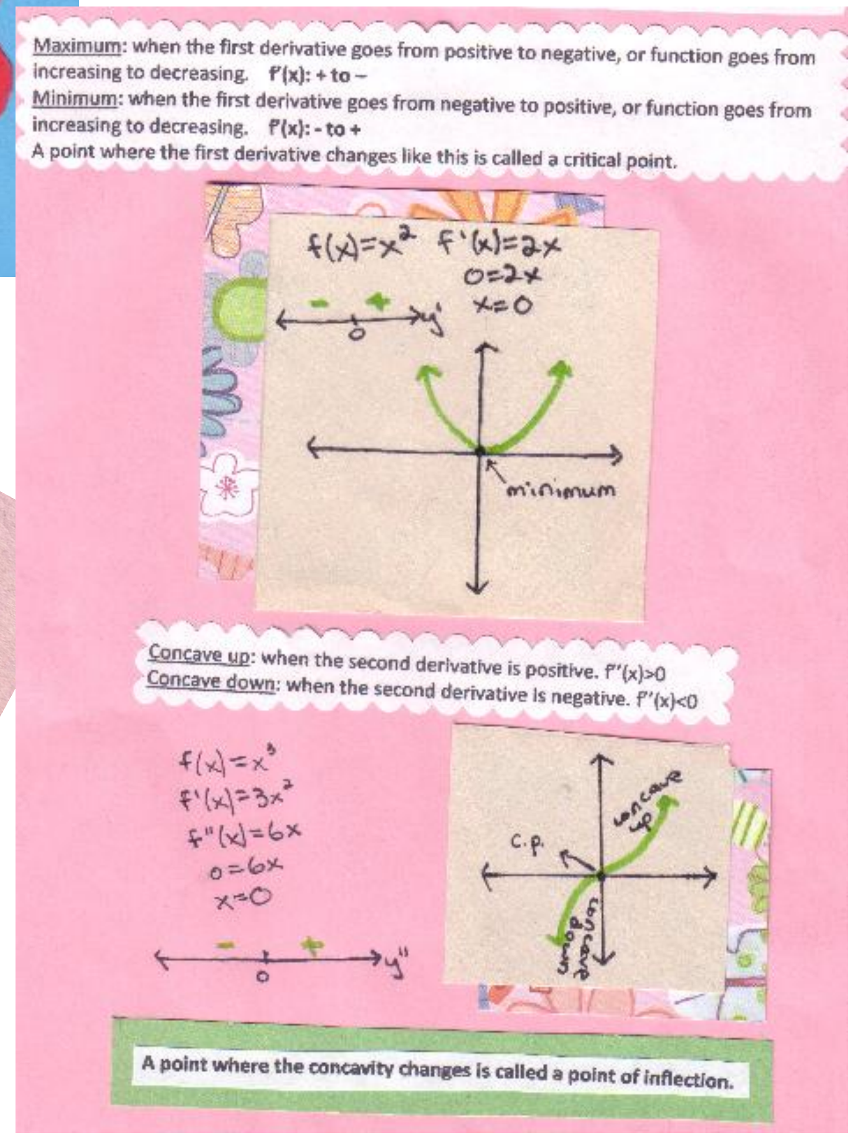


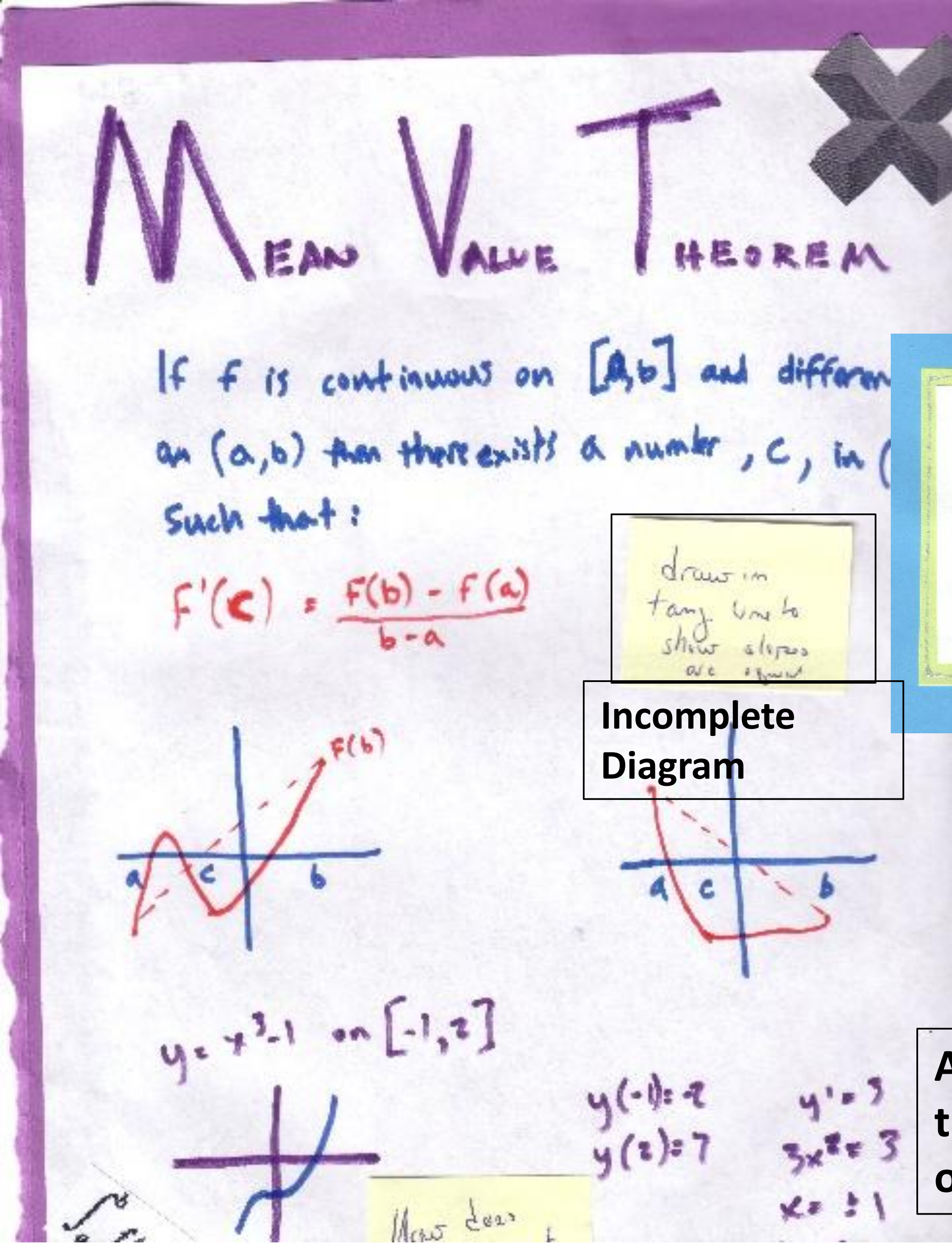
Diagrams are required





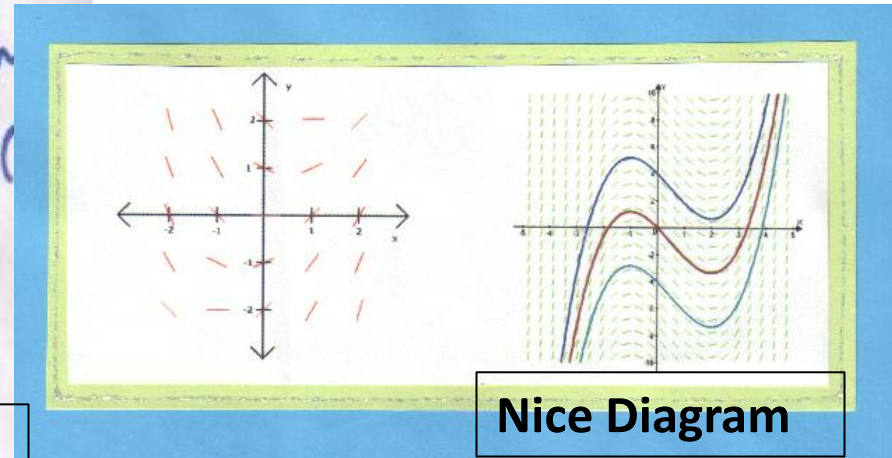






Complete diagrams help for better understanding.

Incomplete Diagram



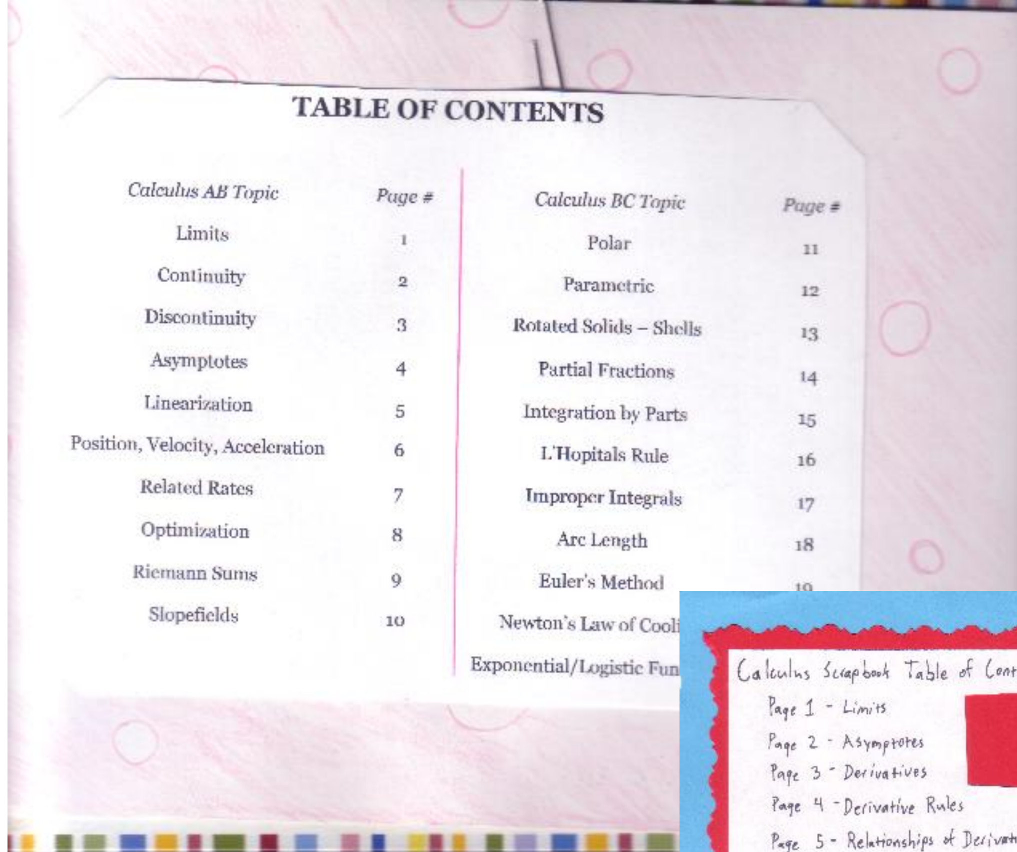
Nice Diagram

A better diagram would have made the relevance of this example more obvious.

Does the order in which you present your topics make sense?

What do you see wrong with this presentation?

Table of Contents



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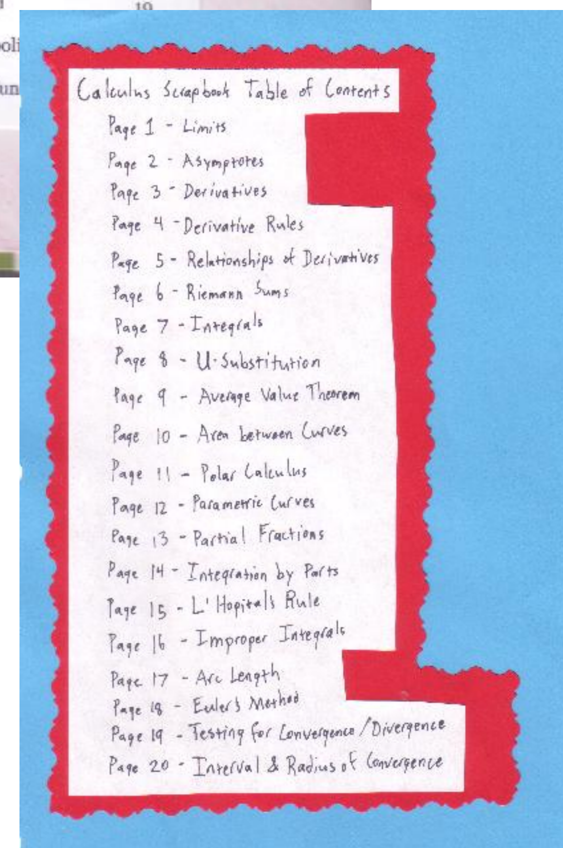
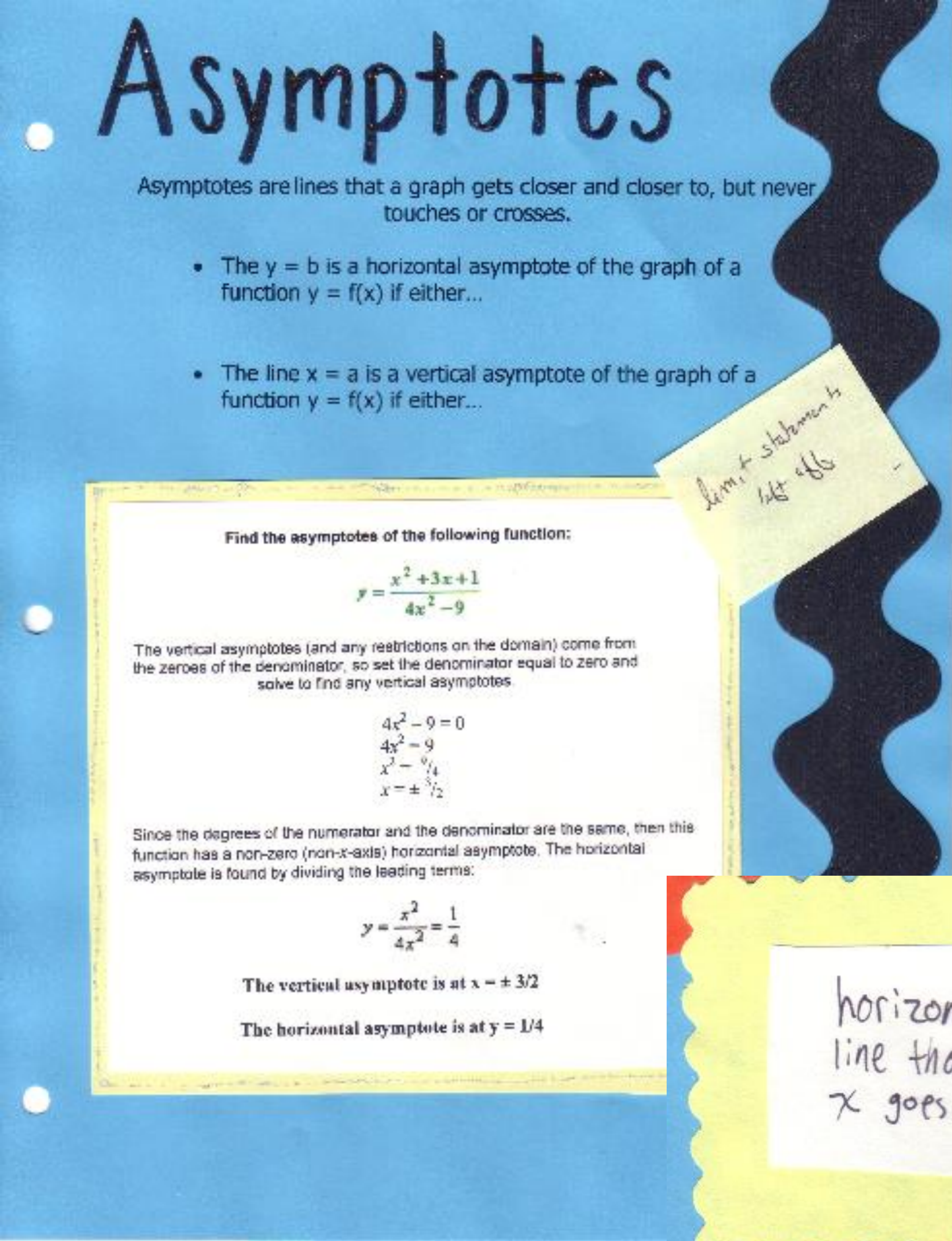
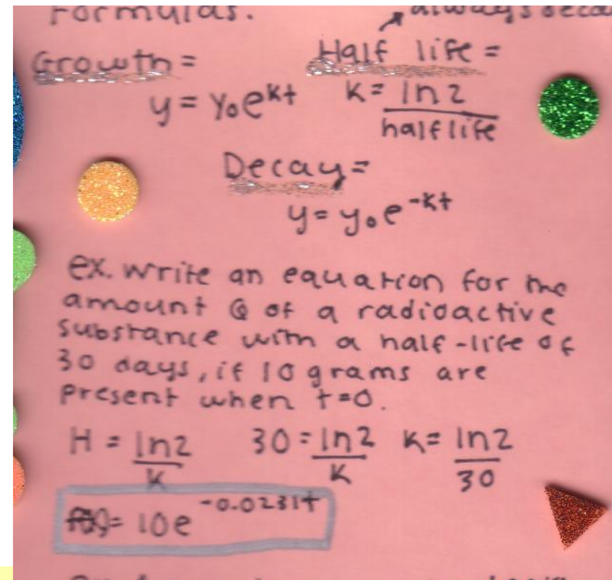


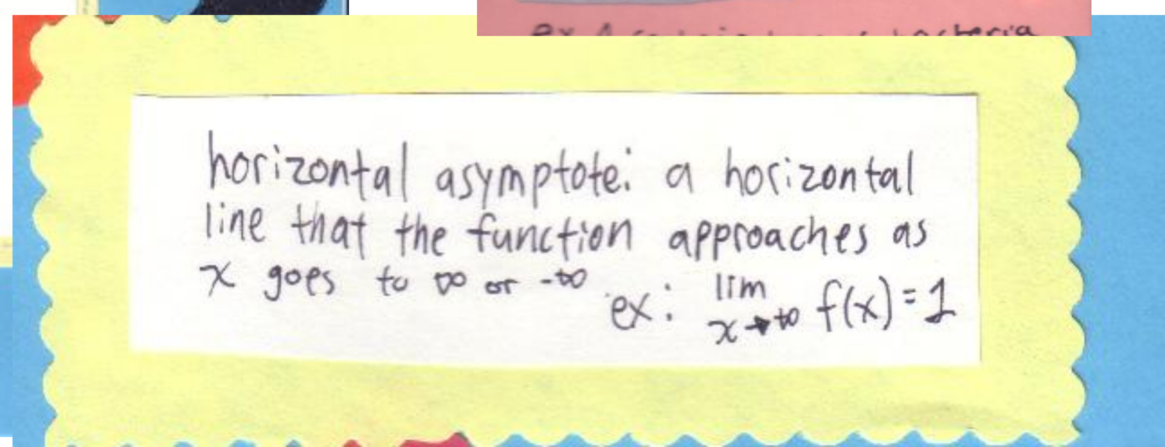
Don't forget the table of contents AND don't just throw it in the project at the last minute!!!

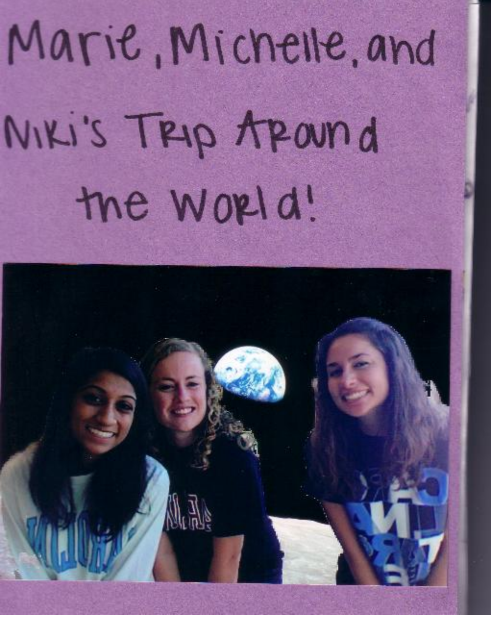
These are good and were definitely in the book before arriving to class on the due date!



Make sure that topics that were introduced in precalculus are presented from the calculus perspective.







Have a Theme

Story

Journey

Consistent Page Formats