$$\lim_{h \to 0} \frac{2(x+h) - 1 - [2x-1]}{h}$$

$$\lim_{h \to 0} \frac{\cancel{2x} + 2h \cancel{-1} - \cancel{2x} \cancel{+1}}{h}$$

$$\lim_{h \to 0} 2 = 2$$

$$\lim_{h \to 0} \frac{2(x+h) - 1 - [2x-1]}{h} = 2$$

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$$\lim_{h \to 0} \frac{(x+h)^2 - x^2}{h}$$

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

$$\lim_{h \to 0} \frac{2xh + h^2}{h}$$

$$\lim_{h \to 0} 2x + h = 2x$$

$$\lim_{h \to 0} \frac{(x+h)^2 - x^2}{h} = 2x$$

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$$\lim_{h\to 0} \frac{(x+h)^3-3(x+h)+1-(x^3-3x+1)}{h}$$

$$\lim_{h\to 0} \frac{x^3+3x^2h+3xh^2+h^3-3x-3h+1-x^3+3x-1}{h}$$

$$\lim_{h\to 0} \frac{3x^2h+3xh^2+h^3-3h}{h}$$

$$\lim_{h\to 0} \frac{h(3x^2+3xh+h^2-3)}{h}$$

$$\lim_{h\to 0} 3x^2+3xh+h^2-3 = 3x^2-3$$

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$$\lim_{h \to 0} \frac{(x+h)^3 - 3(x+h) + 1 - (x^3 - 3x + 1)}{h} = 3x^2 - 3$$

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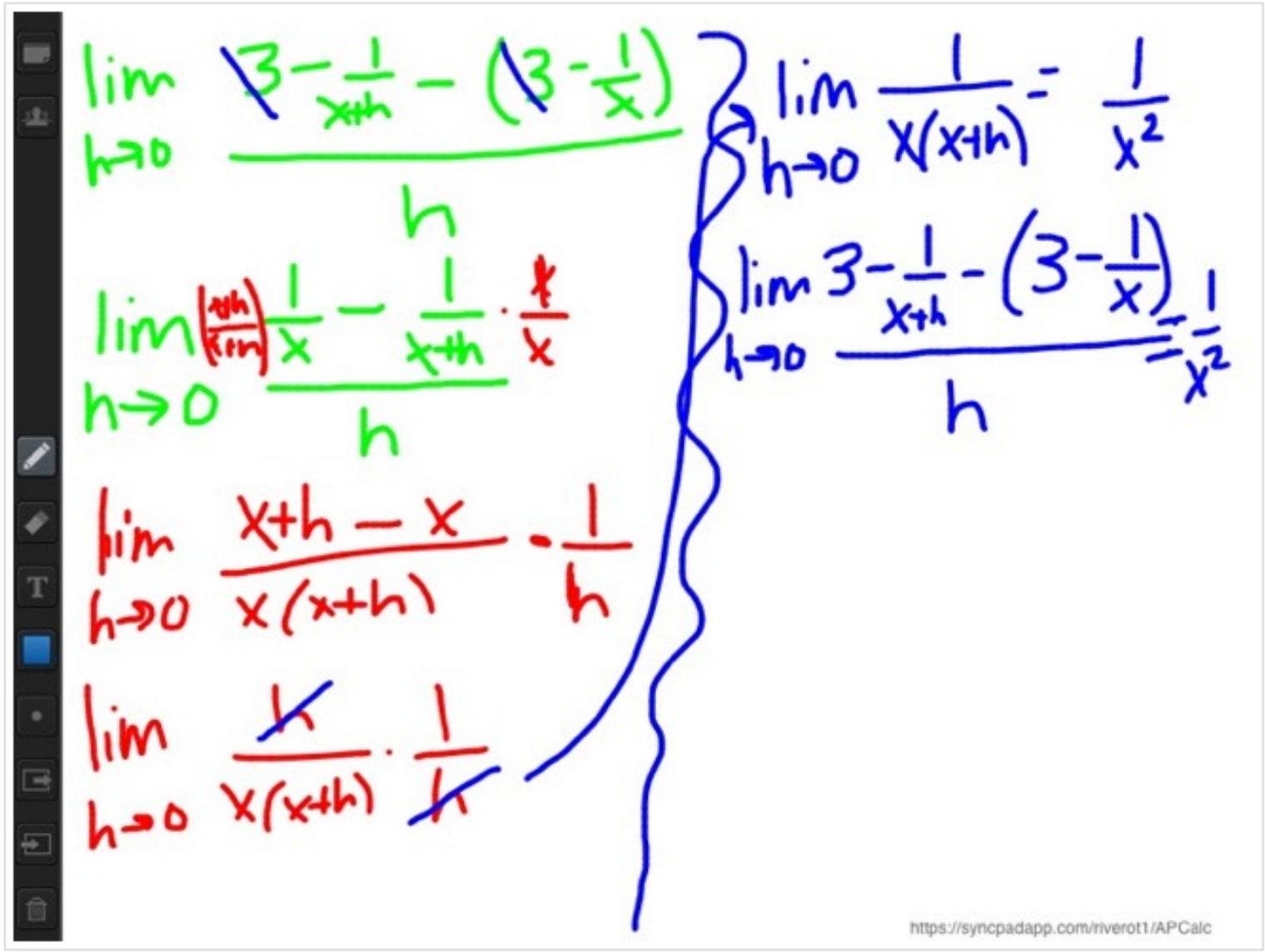
$\lim_{h\to 0} \frac{3-\frac{1}{x+h}-\left(3-\frac{1}{x}\right)}{h}$
$\lim_{h\to 0} \frac{\frac{1}{x}-\frac{1}{x+h}\cdot\frac{x}{x}}{h}$
$\lim_{h\to 0} \frac{x+h-x}{x(x+h)}\cdot\frac{1}{h}$
$\lim_{h\to 0} \frac{h}{x(x+h)}\cdot\frac{1}{h}$
$\lim_{h\to 0} \frac{1}{x(x+h)} = \frac{1}{x^2}$
$\lim_{h\to 0} \frac{3-\frac{1}{x+h}-\left(3-\frac{1}{x}\right)}{h} = \frac{1}{x^2}$
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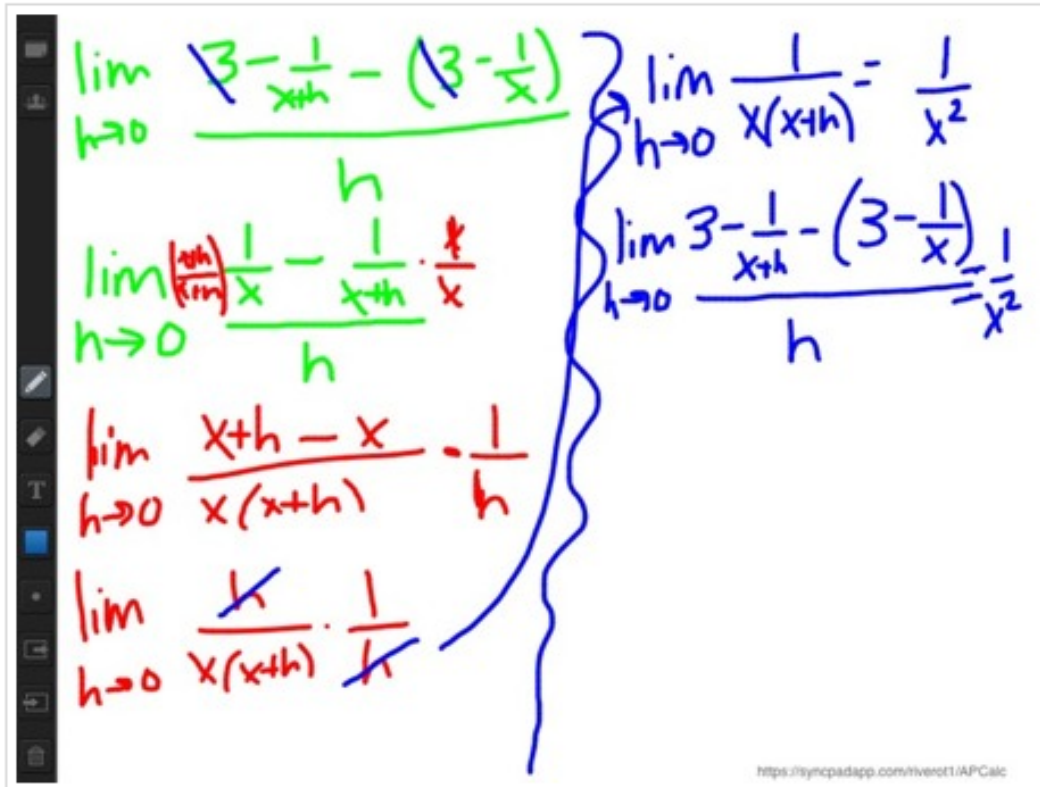

$\lim_{h\to 0} \frac{3-\frac{1}{x+h}-(3-\frac{1}{x})}{h}$
$\lim_{h\to 0} \frac{\frac{1}{x}-\frac{1}{x+h}}{h}$
$\lim_{h\to 0} \frac{x+h-x}{x(x+h)} \cdot \frac{1}{h}$
$\lim_{h\to 0} \frac{h}{x(x+h)} \cdot \frac{1}{h}$
$\lim_{h\to 0} \frac{1}{x(x+h)} = \frac{1}{x^2}$
$\lim_{h\to 0} \frac{3-\frac{1}{x+h}-(3-\frac{1}{x})}{h} = \frac{1}{x^2}$
https://syncpadapp.com/riverot1/APCalc

$f(x)$	Derivative
$2x-1$	2
x^2	$2x$
x^3-3x+1	$3x^2-3$
$3-\frac{1}{x}$	$\frac{1}{x^2}$

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Definition of derivative

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

Notation for derivative

$$f'(x) \text{ or } \frac{dy}{dx} \text{ or } y'$$

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Derivative = Slope

Use the derivative to find the slope of the tangent line at any given x value. A derivative of a function is also a function.