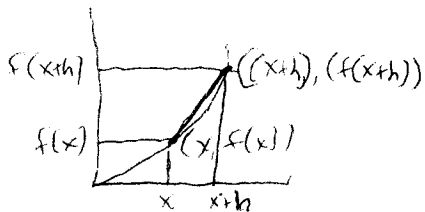


Math Analysis A Handwritten Quiz

Given $f(x) = x^2 + x + 3$, $x = -1$

① Graphic for definition of a derivative



④ Check answer using power rule

$$f(x) = x^2 + x + 3$$

$$f'(x) = 2x^{2-1} + x^{1-0} + (0)3$$

$$\checkmark \boxed{f'(x) = 2x + 1}$$

② Derive slope of tangent line to a curve formula:

$$\text{Slope} = m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope of a secant line on graph

$$\text{slope} = m = \frac{f(x+h) - f(x)}{x+h-x}$$

Slope of tangent line to the curve

$$\text{slope} = m = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{x+h-x}$$

$f'(x)$ = slope of tangent line to the curve

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

⑤ Find equation of a line tangent to the curve at a given location.

$$f(x) = x^2 + x + 3$$

$$f(-1) = (-1)^2 + (-1) + 3 = 1 - 1 + 3 = 3$$

$$\text{Slope} = f'(x) = 2x + 1$$

$$m = f'(-1) = 2(-1) + 1 = -2 + 1 = -1$$

$$\boxed{\text{Slope} = -1}$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -1(x + 1)$$

$$y - 3 = -x - 1$$

$$y = -x + 2$$

$$y = -x + 2$$

$$\boxed{x + y = 2}$$

Standard form

$$\boxed{y = 2 - x}$$

Slope-intercept form

③ Use definition to find the slope

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

$$f'(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 + (x+h) + 3 - (x^2 + x + 3)}{x+h-x}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + x + h + 3 - x^2 - x - 3}{x+h-x}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{2xh + h + h^2}{x+h-x} = \frac{2xh + h + h^2}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} 2x + h + 1$$

$$f'(x) = 2x + (0) + 1 = 2x + 1$$

$$\boxed{f'(x) = 2x + 1}$$

⑥ Give anti-derivative formula

$$f(x) = \frac{x^{n+1}}{n+1} + C$$

$$f(x) = \frac{2x^{1+1}}{2} + \frac{1x^{0+1}}{1} + C$$

$$\boxed{f(x) = x^2 + x + C}$$

The constant "C" represents any integer that may have been lost during the derivative process.

