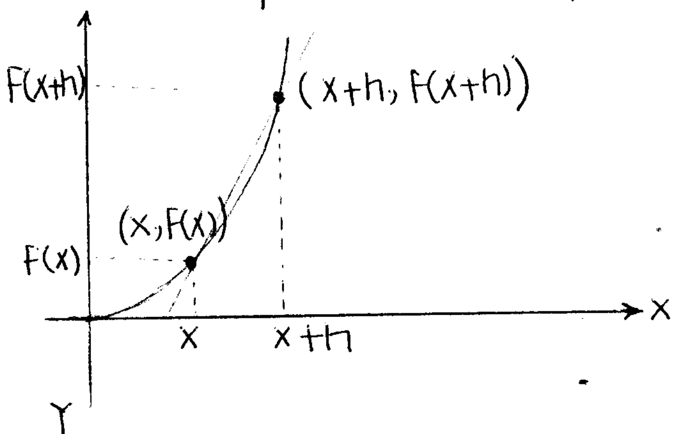
Math Analysis Handwritten A

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

1. The Graphic of the definition of a derivative



2. Deriving the Slope of a tangent line to the curve Formula (derivative)

slope $= m = \dfrac{y_2 - y_1}{x_2 - x_1}$

slope of the secant line

$m = \dfrac{f(x+h) - f(x)}{x+h-x}$

slope of ~~a~~ tangent line to the curve

$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{x+h-x}$

3. Finding the slope using the derivative formula

$m = f'(x)$

$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{x+h-x}$ $\quad f(x) = x^2 + x + 3$

$f'(x) = \lim\limits_{h \to 0} \dfrac{(x+h)^2 + (x+h) + 3 - (x^2 + x + 3)}{\cancel{x} + h - \cancel{x}}$

$f'(x) = \lim\limits_{h \to 0} \dfrac{\cancel{x^2} + h^2 + 2xh \cancel{+x} + h \cancel{+3} \cancel{-x^2} \cancel{-x} \cancel{-3}}{h}$

$f'(x) = \lim\limits_{h \to 0} \dfrac{\cancel{h}(\cancel{h}^{0} + 2x + 1)}{\cancel{h}}$

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

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

the slope/ derivative

4. Power Rule

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

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

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

$f'(x) = 2x + 1$ ✓

5. Equation of a line tangent to the curve of ~~this~~ location: $(-1, 3)$

$x = -1$

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

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

$f(x) = 3$

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

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

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

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

$y - 3 = -x - 1$

$y = -x + 2$ slope intercept form

$x + y - 2 = 0$ standard form

6. Anti-Derivative Formula

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

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

$f(x) = \dfrac{\cancel{2}x^2}{\cancel{2}} + \dfrac{1x}{1} + C$

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

C represents any constant that might have been lost through the anti-derivative process