

Part II: Growth

The problem I have chosen to exhibit my growth is problem #3 from Sample Exam #1. I chose a problem from this exam because I really struggled applying the material in a context that prohibited the use of notes and textbooks. More specifically, it is a problem where you must find the derivative using the definition of the derivative and limits. The problem is as follows: $f(x) = 3x^2 - x$, what is $f'(x)$? I think initially I might have struggled with this problem and problems similar to it because my factoring skills and basic algebra skills were severely out of practice. I had not taken math in almost a year and a half. Mistakes that I made included canceling out variables that could not be cancelled, incorrectly FOILing, and not using the correct definition of a derivative. To solve this problem, the first thing you must do is write out the correct definition of a derivative,

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

Then, you need to plug $f(x)$ into the definition of $f'(x)$, which also tripped me up sometimes depending on how complex $f(x)$ was. This would give you $\lim_{h \rightarrow 0} \frac{[3(x+h)^2 - (x+h)] - (3x^2 - x)}{h}$.

After that, you FOIL the $(x+h)^2$ and distribute the 3 as well as both negative signs to simplify the numerator, which gives you

$$\lim_{h \rightarrow 0} \frac{3x^2 + 6xh + 3h^2 - x - h - 3x^2 + x}{h}$$

Then you want to cancel to simplify the overall fraction and then re-write what you have as one clean function, which would leave you with

$$\lim_{h \rightarrow 0} \frac{6xh + 3h^2 - h}{h}$$

Now, you can pull an “h” out of the numerator so the “h” can cancel with the one in the denominator. It should look like this: $\lim_{h \rightarrow 0} \frac{h(6x + 3h - 1)}{h}$.

Re-write again after you cancel the “h’s”, and in this case, you are done with the simplification part of the problem.

$$\lim_{h \rightarrow 0} 6x + 3h - 1$$

Because the h approaches 0 in the limit, plug in 0 for all the h variables and drop the limit leaving you with, $6x + 3(0) - 1$, and then you have the answer, which is $6x - 1$.