Content Skill

This semester, we've covered many different topics: limits, trigonometric functions, infinity, optimization, derivatives, and so much more. I'd like to bring attention to one specific content skill, known as the Chain Rule, which I've developed a deep understanding concerning.

The Chain Rule is a formula used to compute the derivative of a composition of two or more functions. That is, if f and g are functions, then the chain rule expresses the derivative of their composition f * g.

Regarding derivatives, the Chain Rule is often considered the most difficult to comprehend by newcomers to the concept. It's easy to lose your place and can't necessarily be done in someone's head either.

As a class we had previously covered all other methods for determining derivatives, so I was curious about this rule. At first we were presented with basic problems that forced us to think about what we needed to know to finish them. These problems presented us with a situation that we couldn't solve with our understanding of math at the time. It was obvious we needed something more in order to complete them, but we didn't know what. That extra something that we needed was the chain rule.

We were then all given a worksheet that guided us through the basics of what the chain rule is so that each of us could comprehend it at our own pace. (Personally, I like it when I'm given the tools and resources to discover something on my own, and then given affirmation that the path I'm on is correct.) We then reconvened as a class and discussed what each of us felt the rule was, eventually arriving at a consensus. To double check, we analyzed a few more problems to make sure that we were accurate, which luckily turned out to be the truth. After this class discussion, we were able to go off on our own and practice our newfound skill, permanently solidifying it.

This approach greatly aided in my understanding of this concept and made learning it not only easy but fun. I've discovered that I like to be able to attempt problems by myself first, and then collaborate with peers on any roadblocks.

By myself, I was able to take to heart the step-by-step process that would prevent me from mixing up any terms. Then as a group I learned WHY these steps worked using multiple proofs.

For me, the easiest approach to these problems is to break them up into two different miniature problems, eventually combining everything at the end. Eventually, I reached a point where I could do the first part of the problem mentally, but I know I'll always have this approach as a backup in case I get rusty. Being able to do mental math in and of itself shows a deeper level of understanding; you have to REALLY know a concept in order to compute it entirely in your mind. It also helps in completing necessary calculations faster, which means that you get to allocate more mental effort to the problem as a whole, instead of just one component inside of it.

Below you'll find an example problem that we discussed as a group. (Anything in red is my personal annotations for understanding.)

f(x) = sin(4x + 3)	The initial problem
u = (4x + 3) du = 4	Then break the problem into two parts and focus on this part. The derivative of this is 4.
f'(x) = cos(4x + 3) * 4 = 4 cos (4x+3)	Now let's combine the two separate parts and simplify. Easy!

Problem-Solving Skill

For me math isn't just about concepts and equations, it's also about thinking and problem-solving. This year in the math arena, I feel that the skill I'm most focused on at the moment is recognizing and resolving errors.

As a person, I tend to have a creative and artsy side, but I simultaneously am very tuned into detail and order. The creative side of me allows me to think outside of the box and come up with different methods for solving problems. I enjoy being creative in my work. I thrive in what I like to call "organized chaos." Everything might look out of place but in reality, it is exactly where I need it to be, and math is no exception.

I always take notes on scrap pieces of paper, not abiding by any real organizational system, yet I never lose anything. The notes themselves are very meticulous; I never leave out any detail. I write so that anywhere from a week to a year from now I can look back and follow my steps perfectly.

I thrive on the steps and processes of math. I love big and complicated problems that fill up multiple sheets of paper. Because of this love, I often get hung up on the tiny minutia of problems. I want to be able to comprehend the conceptual side of math, and also be able to implement those concepts with 100% accuracy.

My "organized chaos" approach of mine is both a blessing and a curse. It's been beneficial to my educational career to get math assignments correct. However, when I find myself confronted by a challenging problem, I'm unable to move on until I've completed it. This often results in the spending exorbitant amounts of time on problems that in reality don't deserve more than 10 or 20 minutes. However this doesn't limit my understanding of the larger picture in regards to the problem. Yes I may be focused on one component of the problem, but I still am able to see how all the pieces fit together.

I’m working towards being able to continue fostering my ability to be meticulous while simultaneously allowing myself to let go and be able to move on to other questions. I can always come back. I will do this by timing myself, and if I am still on the same problem after 20 minutes, I will force myself to move on.

I look forward to the continuation and cultivation of this aspect of myself; both in and outside of math class.