

Problem 10 on the MATH 31A Final of Winter 2010

The following is the last question which appeared on the final of MATH 31A in Winter 2010.

10. In ten lines or less, please tell us three things that you have learned by taking this class. (There are **no** wrong answers, you will get full credit as long as you write anything, so please be honest!)

The answers given by students were fantastic and approached the question in a variety of ways (some literal and others more of a general opinion about the class and other things). Since we enjoyed the answers so much we have decided to share them with the rest of the class.

The answers given below are in **random** order and all personal/embarassing/identifying comments have been removed (i.e., no one will know who wrote what). Also, the following have been true to the original source as much as possible, however any typos are most likely the fault of the transcriber.

This class has taught me not only the theory behind calculus, but also the pragmatic applications of those theories. I have learned how to estimate for example the largest possible value of an area through optimization. I have also learned how to calculate areas under curves using integration, as well as rotating volumes using both the washer method and the shell method.

Always watch out for arctan

$$\frac{d}{dx} \sin x = \cos x$$

How long you can hold your bladder during a test.

I have learned about solving problems, using derivatives and critical thinking skills.

- Calculus is hard
 - 10am is earlier than it sounds
 - It's much easier to tell yourself you're going to "watch the podcast instead" than actually doing so.
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By taking this class I have learned that you must go to office hours and ask questions because they do help a lot. Before this class, I never went because I was scared, but I found that my professor was cool. I have also learned that high school calculus and college calculus are 2 different ball games. Furthermore, this class has really forced me to see if I really enjoy math like I think I do ...

- 1) If you can't solve a problem one way you can solve it another way
- 2) Stay calm & relax when taking an exam
- 3) Read the conceptual stuff for math to know when you can apply diff methods
- 4) GET SOME SLEEP BEFORE YOUR FINAL!

Thank you Pro. Butler & the T.A.'s

This class has taught me to think critically about the applications of calculus to everyday life. By understanding the concepts such as optimization and related rates I am now able to better appreciate

calculus more in the context of our everyday lives. I learned how to maximize and minimize (profit and costs), how to understand better where the concept of integrals came from (Riemann sums) and the applications of instantaneous rates of change as opposed to average rates of change.

I learned how to manage my time better and improved my studying techniques. This class was a lot easier to understand than my previous calculus class.

I will always remember the second derivative test by ☺ ☹ ☹

Three things I've learned from taking the class:

- 1) messing up on simple algebra can really ruin your whole problem
 - 2) math can be fun as long as you have an awesome professor
 - 3) you can master concepts without practicing it over + over + over + over
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I have learned the general formula to take a derivative, which is $\frac{d}{dx}(x^n = nx^{n-1}$. From the derivative I learned you can find tangent lines, which are lines that touch the curve. Second, I learned how to approximate things through linear approximation. If I wanted the $\sqrt{26}$ I would approximate it near $\sqrt{25}$ and get close to the actual square root with the formula $f(x) = L(x) = f(a) + f'(a)(x - a)$ [tangent line]. Finally I learned that although I will never be a math/calculus major that math is beneficial because it helps you to learn how to solve any types of problems, math related or not!

I have learned the rules of derivatives, integrals, trigonometry, & how to really break down problems that appear grotesquely difficult into manageable pieces.

What I have learn in this class is never to under estimate the tests. There tough problems on the midterms and final that I really didn't see coming. I also learn about derivatives (not sure if that's how you spell it. Tough concept devs, and intrigation. I also learn that these college math classes are no longer taught like high school courses, in which I learn through reapeation, asking the teacher, and friend. Instead math classes here are taught through a cold-shoulder in which everyone is trying to get at you.

- I have learned that I really need to know whats going on with the material to excel in this class
 - Going to office hours is incredibly beneficial
 - Professors can actually teach you things about life, and not just the subject they're teaching.
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This class was very interesting. I felt that I learned a variety of new concepts but I was not able to proficiently apply them to the test. I feel like the test were pretty hard and I would be confused when I took them. This final had its hard problems and not so hard problems. Besides learning the math concepts like derivatives, related rates, area, etc. I feel that I learned more values at college. Not every test will be easy, not every class will be easy. You study and that is all you bring to your final or midterm. This class was great. Thank you Professor Butler.

Three things I learned in this class include finding the tangent line of a curve, solving simple related rates and area problems, and that the derivative of $\arctan x$ is $\frac{1}{1+x^2}$.

I have learned that calculus applies to almost everything around us because mostly everything is a rate of change. Thus, learning how to calculate a rate of change is very useful to real world applications. Also, I learned that only with practice will you ever be good at mastering something, especially math. Lastly, it is very important to use the tools one has learned in order to solve a problem that at first may look difficult.

[...] Integrals and OCD combine to find volumes of household items like cups, pools, and fountain basins [...]

I learned how to do optimization problems. I also learned that even if some of Professor Butler's word problems sound ridiculous, math can actually be applied to real life situations. From watching Professor Butler, I learned that some people actually do enjoy math.

I have learned implicit derivatives, the chain rule and the mean value theorem.

In this class I have learned some very important things. Besides for taking derivatives and integrals I have learned that I have to do my homework to succeed in a class like this. I have also learned that cramming the night before a midterm does not help, and preparing for tests in advance is always a good idea. I have also learned that math can be really, really cool!

- I learned how to break down a test/question.
 - I learned that you should not get stress.
 - Do a lot of problems to get it!!!
 - I learned to calculus (so obvious)
 - Good professor but very hard test
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- 1) First thing is that I learned how to take the derivative of a function in less than 15 seconds.
 - 2) Second thing I learned is how to do the reverse of a derivative which is the integral.
 - 3) The third thing that I learned is that the first derivative is used to find measures for the velocity & the second derivative corresponds to measures of acceleration!
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- I learned how to integrate, what the squiggly line means.
- [...]
- I should've utilized my TA more.
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I had never in previous math classes understood the formula for the derivative $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ until this class, nor did I understand the definition or purpose of the limit. I also learned that math can be accessible if you have a funny professor; I just have to put in the work and do my part. Lastly I learned that I'm switching majors. Thanks!

P.S. Also cool when Butler mentioned subconscious mind; I find it fascinating.

I learned that calculus is hard.

I will never be a math major or minor.

Regardless of the amount of time I study, I will never be ready for Professor Butler's test.

Math is complicated.

Three things that I learned by taking this class are (1) how to take concepts and apply it to problems, (2) how to solve related rates & optimization problems and (3) how to apply shortcuts to simplify certain problems to make them easier to solve.

I have learned many things in this class. One was the fundamental theorem of calculus, parts one and two. Another thing I have learned is how to graph graphs which proved to be very helpful. This helped me visualize problems. I learned how to problem solve. I learned that I hate word problems. I learned that I can get things done on time. I learned that some professors will be harsh. I learned how to be a good student. Have a great day! This calls for another undie run!

Above all, math 31A has taught me what "calculus" actually is because this is my first time taking the subject. I am no longer oblivious to the word derivative because I know it is just a fancy name for a simple equation/law. Even though I did not learn the material "quick" enough to earn a better grade [...]

I have learned how to take derivatives and antiderivatives. I have also learned to keep trying and trying until I get the answer that I'm looking for, and I've learned that I'm not as bad in math as I thought (despite the test scores, of course)!

1. I have learned about how to actually use math in an application driven way. In my previous math experience it has been memorizing-chugging & plugging type of work.

2. I have also learned that waiting to study for a math exam at the last minutes causes lots of undue stress. I am used to not studying for math & excelling! This class has given me tools to learn to study for mathematics, in general & for examinations.

3. I have lastly learned what all these random formulas/equations are that I learned previously from other mathematics courses. Before it was "do this blind math/busy work", now I see how all the pieces fit together.

1. The best way to study is to go through practice/previous tests

2. Tutoring is very useful!

3. Don't miss discussions, & try out other discussions as well. b/c some TA's match your learning skills better than others.

I took calculus in high school, so I did not think I would have trouble with this class. I was wrong; it was **very** challenging. I learned how (1) to study for calculus by following along with the answer key, (2) how to rotate shapes around the x & y axis and (3) how to implicitly differentiate a function with x & y .

Math had always come easily to me, so this class was frustrating. However, I learned how to approach calculus in a different way. Example problems are a lot more helpful than concepts.

Of course I have learned calculus. Taking derivatives, integration, limits, and all that other fun stuff. But most of all I learned what college tests are like, and that in high school I relied way too much on a calculator to do my work. I also learned that tests are way different from what the homework is, although homework is supposed to prepare us (which it does, to a certain extent.)

I've learned differentiation and anti-differentiation. However, I feel that the tests are designed too difficult, and that you could test our knowledge just as well with easier tests.

- I learned to find the area between two curves using integration.
 - I learned to draw a curve from scratch (again!)
 - I learned how to find the area under a singular curve.
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- I learned about optimization
 - I learned what an integral was.
 - I learned how to take a derivative.
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I have learned in this class that:

- 1) I am not good at calculus and am glad at not being in a math-oriented major.
 - 2) Numbers like to arrange themselves in a very specific way that is beyond my comprehension.
 - 3) Calculus is using abstract ideas to solve the physical space.
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I have learned applications relevant to my major of economics. As we had on one of the practice finals was a problem about diminishing returns to find out how many hours of studying would we benefit the most from. Most memorable was how to determine concavity, concave up, concave down from using the second derivative. Although Professor Butler designs his tests to be tricky he adds humor to ease being nervous. A point he has told us in doing our best but not becoming over stressed.

- 1) err, err and err but less, less and less
 - 2) Fool me once shame you, fool me twice shame on me
 - 3) when you think that you've studied enough, study more maths
 - 1) leant that by the MVT if $f(a) = f(b)$ then for some c in $[a, b]$ $f'(c) = 0$.
 - 2) Limits are tricky but multiplying by the conjugate makes some limits less tricky to find.
 - 3) Professor Butler's tests are hard
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I have taken high school calculus before and never really understood limits, I absolutely hated them. Now, I continue to hate them but have a better grasp on them. I also learned the proofs of different theorems and rules (such as the product rule and the MVT) which helped me better understand them. In a not material sense, I learned practicing over and over and over again and studying until you want to pass out is best for this course. I also learned how to divide by 3 for the seating of the tests! (joking) Have a great spring break!

I personally struggles in this class. One of the things I learned was to be persistent. Even though I had a hard time with a lot of the harder calculus stuff, I managed to understand a lot of the ideas and concepts in the class. Also, because I spent more time on this class than any other, my time management skills became a lot better as the course of the quarter went on. Besides that, I am glad I learned related rates. Those were actually a lot of fun to work on and Professor Butler made them fun as well.

In this class, I learned about implicit derivatives, related rates, and how to get the area between 2 curves.

I used to be good at math in high school, but that all changed after I took AP calculus. Most of this material I have seen before but I am still not very good at it, even though this is my second time seeing it. The way you taught the material was somewhat easier to understand so thats a plus.

The first main thing I learned from taking this class is that the only way you'll be really good at math is practicing, a lot. Being able to do one example doesn't mean much because other problems will be different. The second thing I learned from this class is that it's important to understand the concepts well so you know how to apply them to different situations where you won't be told explicitly what to do. The third thing I learned from this class is to not get frustrated and try out different methods. That's because I'm planning on majoring in [...] & those problems will be new & unsolved so I'll have to uew what I know to solve these problems since I won't be told how to.

- 1) practice, practice, practice **problems**, it helps a lot
 - 2) going to office hours is a tremendous aid when having problems
 - 3) DON'T rely on homework problems to be as easy as those on midterms
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I learned about derivatives, differentiation, integration and I could make a list, but that would not tell you what I learned. What I really learned was how derivatives and integration actually work, the fundamental mechanics thereof (because I am new to calculus). I also learned that calculus is nowhere near as intimidating as I initially thought it to be. Finally, I learned that $\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$.

Three things:

- I learned about the chain rule. I found the chain rule really interesting.
 - I also learned about not giving up. [...]
 - I also learned that calculus can be fun if you know how to use the right tools and formulas.
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1. I learned how to take limits.
2. I learned that math is hard.
3. I learned what integration is.
4. I learned how to take derivatives.
5. I learned what signed area is.
6. I learned how to do optimization problems.
7. I learned how to do related rates problems.
8. I learned that math classes are curved.

9. I learned that I should go to lecture more often.
 10. I learned that I shouldn't leave everything until the last minute.
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1. I have learned that drawing 3D objects on paper is **very** difficult when thinking about integrating volume.

2. After taking the second midterm, I watched a curling match and I learned that it's actually a fun sport to watch, especially when the US team has funny Minnesota/Wisconsin accents.

3. I learned that hard problems can actually be fun if you look at it like a puzzle needing to be solved. It may look like its missing pieces, but you really just have to rotate it and it fits right in: puzzle solved!

I learned how to make the most of what I am given, thanks to optimization. I learned that going to office hours is definitely helpful. Lastly, I learned that contrary to what I initially believed, professors are not scary, and that they are professor because they love to teach. Thus they **are** concerned about whether, or not, the students actually learn the material.

I have learned to use methods of computation that I know in order to solve problems I don't know.
I have learned to love curved classes.
I have learned that I actually like the applications of calculus.

Taking this class I have learned a few things. I learned how to integrate functions using the substitution method. I've also learned how to know whether a function is going to be concave up or concave down using the 2nd derivative test. The smiley faces were a great way to remember it. Lastly I learned how to find the area between two function curves.

Calculus is complex and without a proper foundation in Algebra it makes understanding Calculus even more difficult. I've also learned that Calculus can be applied to more real life situations, than any other forms of mathematics I have learned so far. Finally, what looks simple and elegant on the surface is indeed complex when studying it. I have gained a fair amount of appreciation for those great men of science who used mathematics to gain a better understanding of the natural world.

I learned about how to integrate $\sqrt{\quad}$ better by using piecewise functions that was really helpful.
Also learned about revolution, I didn't learn about that in high school.
And lastly I get integrals much better now.

From this class, I have learned how useful it is to review your notes every week. I always liked how Professor Butler reviewed concepts from previous lectures at the beginning of each lecture. As for actual concepts in the class, I learned about related rates which I didn't like at first but have come to enjoy. I also learned about how to take the area between two functions.

I have learned the importance of understanding concepts. In my other math classes I had always just memorized how to execute specific problems but Professor Butler has shown me that you must actually know the concept in order to succeed in his class.

By taking this class I learned

- 1) Math professors can be funny
 - 2) Finals & Midterms are hard with this professor and the thing is he enjoys making them hard (will I guess its to challenge us), but sometimes that doesn't go so well.
 - 3) Calculus is all over the place in real life you can make a math problem out of anything!!
 - 4) Calculus stuff
 - 5) ALL OF THE ABOVE
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I've had a really hard time in this class. I understand the material but when it comes down to taking the tests I feel totally lost. But I have learned to be a critical thinker and think outside the box. I have also learned that math is definitely not as easy as I thought it was in H.S. I learned many concepts of math that I had no clue about before taking this class.

I have learned that everything in life will still be of & that you will still love us despite our terrible grades. I've learned that math is a complicated process using theory's & concepts rather than just number crunching.

I learned how to take the derivative and the antiderivative of certain equations and be able to interpret their graphs.

I learned that $\int_0^1 \sqrt{1-x^2} dx = \frac{\pi}{4}$. I learned that math, and especially calculus, is not hard if you understand it and practice it enough. I also learned that if the person teaching you something is genuinely passionate about what they're teaching, it's a lot easier to learn and you end up actually liking the work that you have to do for the class. It doesn't seem like as much of a burden to study for the class anymore.

In this class, I've learned about local and global max and mins, related rates, and implicit derivatives. Most of these concepts reinforced my prior knowledge of calculus and also prepared me for the next level of calc.!

I learned calculus is difficult, Professor Butler is a good guy (he is giving us free points) and I may have to change my major if I can not pass this class.

I have learned many logical tools for calculus from the class, both from differentiation and integration. In particular, I learned some definite integrals like $\int_0^1 \sqrt{1-x^2} dx = \frac{\pi}{4}$. I also learned about $\arctan x$ and the derivative of $\arctan x$ is $\frac{1}{1+x^2}$. Lastly, I learned that for integration, it is easier to break things up into parts and add them all up.

- 1) I have learned how to take a derivative of a function.
 - 2) I have also learned how to take the implicit derivatives and applying them
 - 3) I have learned how to find maximum and minimum of equations
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What I have learned in this class is not to think I already know the material just because I took calculus in high school. Professor Butler opened my eyes and I realized there are so many concepts I have not discovered within a concept that I already know. My homeworks did help me understand the class but more that anything it was his lectures. I really learned something in this class which is not to believe I already know the material, do all the homework, and attend every single lecture. Thank you sir!

(1) As I do tricky math problems, I learned how to see a problem from a different perspective. (2) I also learned that I really have to understand the concept (not the equation or formula) to solve math problems. Lastly, (3) I learned that math is enjoyable! I loved Prof. Butler's exam & practice exam problems. Although they were hard. I liked reading & solving those problems. They were very entertaining.

I have improved upon my calculus skills when compared to high school. I now have a better understanding of my concepts of integration and differentiation. What I have learned over the past 10 weeks will go a long way in helping me in any future venture. Thank you!!

In this class I have definitely fine tuned my calculus knowledge. For one, I have finally learned to optimize something which I have always had trouble, but finally learned in this course. I have also learned the mean value theorem & finding the average value of an integral, something that was never covered before by my calculus teacher in high school. The third thing I'll mention, that I have learned and probably the best takeaway from this class, is how to interpret problems better and being able to see a different way around it to solve it or knowing multiple ways of solving it.

[..] Sometimes when you draw pictures on exams, your professor draws you one back!
I drew an awkward smiley-guy because I have no clue how this test will go ... probably awful ...

- I have learned that integration is used to find the area while derivatives are used to find the rate.
- Learned how to look at problems differently. Sometimes it is a lot easier to solve from a different perspective.
- Outside of class, I have learned to effectively work in groups.

I have learned that the only way to get better at a certain type of problem is to practice over and over. I also learned the meaning of differentiation & integration and I learned how to manage my time.

(1) I have learned how to think critically about a problem I do now know the answer to by using the tools and skills I know already and figuring out a way to figure it out. (2) I've also learned that sitting in the front row can help out so much in learning something so difficult. (3) I've learned the practical use of calculus that will benefit me in my major.

- 1) There is usually more than one way to solve a problem, but one is usually easier than the others.
 - 2) Integration is directly related to derivation by the fundamental theorem of calculus.
 - 3) Trig identities are often the key when stuck on a problem.
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1) I have learned that my previous studying methods are nowhere near up to par in order for me to comprehend fully the nuances of differential & integral Calculus. As such, my future efforts will be greatly improved & modified.

2) I've learned how to compute velocity over a variable rate, and also how to compute marginal cost, which is crucial as a [...] major.

3) I've learned that the math in this course is extremely helpful in solving problems in a manner I would not have thought of otherwise. My lack of complete understanding only makes me desire to try harder in the future.

One major thing I learned in this class is not to become intimidated by big problems. They are do-able if you break them down into smaller pieces. I definitely learned better problem-solving and analytical thinking techniques. Many problems forced me to consider things from a different point of view. Lastly, I learned that math homework is more fun than other types of homework, it's like doing brain teasers or sudoku or something. I'd prefer math homework over writing an essay any day.

I now better understand related rates, integrals and volume. I have also learned math is no longer my strong suit and I much rather stick with my [...] major! Also the Professor Butler really cares about his students learning. That's hard to find here.

By taking this class I learned that derivatives are used to find out how fast something is changing w/ respect to another variable. I also learned that integrals are used to find the area under a curve. Lastly, I learned that integrals and derivatives are related through the fundamental theorem of calculus.

By taking this class, I learned that calculus comes to great use in everyday life. Throughout the course, we tackled problems that I actually pictured myself trying to solve in the future. Whether trying to optimize or minimize quantities or finding related rates, calculus can be applied into a wide variety of problems.

I have learned a new focus in problem solving skills. i have also learned that maybe the quantitative side of thinking is something I can do. Further, I learned $\arctan x$ has an awesome derivative!

I have learned how to use the substitution method to simplify the function to find the antiderivative easily (apply chain rule \rightarrow substitution) substitute one part of the function with u and find the derivative of u (du) so we can substitute both parts back to the function to easily find the integral. Secondly, I learned how to use related rates to solve the function by determining the relationship between quantities that are changing, then take derivatives of both sides—using know values to solve the problem. Lastly, I learned the applied optimization method. Overall, I learned how not to give up hope in math. I have always feared math because i can never do well in math class. But this quarter, I just kept trying and hope with repetition of problems, I will get used to the methods, thus do my best in this class.

I learned how to be more efficient when studying for math tests. I also learned a lot about integrations, tangent lines, and volumes of rotation. I believe I have learned enough in this class to go on to the next math class.

Before I took this calculus class, I had already taken it at my high school. However, my understanding of integrals developed, and I now understand the shell and washer methods better. Also, I have improved at optimization problems. And finally, I understand how to find global max and mins. This class has done a good job in expanding my knowledge of calculus.

Taking this class [...] I have learned that through all the hard work that it was worth [it. ...] the problem solving skills learned here can apply to any subject. Also after taking this I learned now to take preparation and studying for granted. Being prepared is important for school and for life. I also learned that math is applicable all around us, & topics that I used to not think much about, such as integration, is used all around us. Math is not easy, but the hard work I put into it taught me that discipline & focus are needed to succeed.

- 1) I have learned calculus, which I never took in high school and most of it actually makes sense.
 - 2) I have learned that it is necessary to remember and practice trig and algebra.
 - 3) I have learned to be confident in math, yay!
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I have learned that I don't only need to memorize a formula. I need to know when to use those tools in certain problems. I also learned that I need a lot of practice not only on homework problems but on more challenging problems. Oh! one very important thing as well is that I learned to really pay attention on what the question is asking because I may think [it] is asking for a certain thing when in reality Professor Butler means something else. An example of this would be problem number 5 on midterm 2.

I learned how to study in groups better and focus on work rather than get distracted by conversation. I learned how to organize my notes into a binder in order to review for the final. Finally, I learned not to stress over exams like these to the point where I lose self-control. I really learned how to tolerate and respect the difficulty of tough exams.

I thought I learned a lot this quarter like u-du substitution, related rates but after taking this final I realized I haven't learned a thing!

In this class I've learned that Prof. Butler likes widgets, or at least problems with widgets. I've gained experience with how to integrate/derive with arctan, but by no means have I mastered it. I've also learned that calculus is a very challenging course, especially when dealing with optimization & related rates.

- 1) Its difficult to judge if you are prepared enough.
 - 2) Math is satisfying when you get the right answer.
 - 3) Math [...] concepts can be applied in numerous different ways.
-

By taking this course I have learned how to:

- 1) take derivatives
- 2) read the book so I can do the homework
- 3) that it takes practice to understand some math concepts

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1. how to think more independently
 2. I am going to major in [...] now because I have learned that I understand math and would like to have a career that involves math
 3. thinking more abstractly
-

1. "Math is awesome!!" – Butler
 2. In regards to math tests
 - a. you can never study too much
 - b. expect the unexpected
 - c. if at first you fail try again
 3. Math questions are like puzzles—you just got to find the right pieces to make things fit
-

One thing I learned is that Professor enjoys making his students suffer and he likes $\arctan x$. Another thing I learned is a helpful tool for concavity (i.e., 😊 ☹️ 😱). also, I learned that calculus is applicable to real life situations. For example, I can use calculus to see how many widgets I should produce to break even.

I have learned that my precalculus skills are not as strong as I thought. I have learned how calculus is applied in "real-life" situations, for example budgeting production in a manufacturing firm to have supply = demand can be found via calculus. Also, I have learned how commonly used trigonometric functions are in problem solving, that I once thought didn't extend their use beyond the unit circle.

- 1) I learned how to solve integrals
 - 2) I learned to use critical thinking skills
 - 3) I learned that math could be very complicated
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This was my first calculus class so everything was new, but in particular, I learned derivatives, integrals, and how to find a tangent line of a curve.

I learned how to find limits, take derivatives of functions, and how to integrate functions

I learned what an integral is (always wondered)
I learned that I am not very good at substitution
I learned a funny joke (I've borrowed the "Adam+Eve, not Adam+derivative joke at least 3 times—and always cited Butler)

1. I have learned that there are always ways to improve as long as you try. I was discouraged after the first midterm but definitely improved on the second.
 2. Learning [in] class can be fun! Thanks professor!
 3. Math takes a lot of practice & is more than just regurgitation.
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The three most important thing[s] I have learned are that local max and mins are not always global max and mins, that the first derivative test can tell you if a function is increasing or decreasing, and the Professor Butler loves $\arctan x$. This has been a very rewarding class and I will never forget the awesome lectures.

I learned the concepts behind the equations and numbers. I learned that I can be good at calculus. I learned that you were a great teacher. Honestly, I despised calculus before taking this class, however the way you presented the material in class made it so much easier to understand.

Thank you!

Three things that I have learned by taking this class includes:

1. learning the difference between differential and integral calculus
 2. the tangent line equation $\rightarrow y = f(a) + f'(a)(x - a)$
 3. continuously practicing a problem helps with understanding it better as in it is vital towards your [...] ability to retain information when it comes to math
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- 1) how to approach a calculus midterm in college (and difficult finals!)
 - 2) how to find relationships between variables (related rates was always hard in high school)
 - 3) that I enjoy math, but hate stress
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I learned how to take a derivative of a function which I think will come in very handy in the future. I also learned how to find the area of a function using integrals. And lastly, I have learned that math can get very complicated but simplifying it into something recognizable is the best approach.

The most important thing I learned from Math 31A is, without a doubt, more analytical thinking. This class was a huge challenge because the test questions required a lot of analytical thinking. They were very different problems that what I was used to and tested my ability to master concepts that I thought I already knew. I also learned how to do substitution regarding antiderivatives and chain rule for taking derivatives, substitution is more difficult, but both are useful.

From taking math 31A here at UCLA I definitely learned that it's not important to just know how to use a formula, but rather, what is important is knowing **when** to use a formula. Also, I learned that the only way to get good at calc is to practice - over and over again. Finally, I learned that a less stressful way to study for math (and all subjects!) is to do a little each day (an hour or so) starting a week or two before the test, as opposed to cramming the night before.

I have learned a tremendous amount of calculus (never took it in high school). I really have learned how to put concepts and equations together to make knowledgeable sense of what we're learning, very interesting! I have learned a lot about graphs and the many thing they, and their equations, can tell you.

In this class I have learned the basics of calculus because I didn't take calc. back in high school. The three things that I have understood the most are finding tangent lines, linearization & optimization. Overall I think I did begin to comprehend calculus, I wish I had just seen it before I took this class.

Three things that I learned from this class is one there are many ways functions can be manipulated, and turned into other functions. Two, I'm not that good at math so good thing I'm not a math major. Three, even though you you know the material you still have a lot more to study. And Professor Butler is an awesome professor because he wants me to pass.

I have, of course, learned more about calculus. I also learned to pace my workload out, because math isn't something you can learn in one day; it takes practice and repetition. One last thing I learned is how hard it is to catch up in a subject once you fall behind, so hopefully I will keep that in mind for future reference so I do not let it happen again.

- I've learned that learning math goes way beyond understanding basic ideas and concepts, you have to know how to apply
 - I've learned that this is just a math class, and whatever happens happens so learn from it
 - I've learned that to really master a concept you have to practice it extensively, without practice we may understand an idea, but when it comes to applying it we have no idea
-

I learned how to find tangent lines
I learned how to find the area under a curve
I learned how to optimize

- 1) I have learned the MVT, & how if it is continuous & differentiable at a point c , then $f'(c) = \frac{f(b) - f(a)}{b - a}$
 - 2) I learned the antiderivative or integral of $\frac{1}{1 + x^2} = \arctan x + C$
 - 3) I also learned about related rates of change, a little optimization (maximizing or minimizing), & a little on finding area between two curves & how you're supposed to subtract the top one from the bottom function, or the right function for the left function from certain points or intersects
-

- (1) One of the things I learned in this class was how to take the area between two functions using definite integrals.
 - (2) Also I learned how to sketch graphs by finding critical points and using first and second derivative tests to sketch the graph.
 - (3) Additionally, I was able to understand the concept of taking the volume of a function when rotated either about the x -axis or y -axis.
-

- 1) I have learned useful methods to approaching problems that appear to be impossible.
 - 2) I have learned that you can have fun while doing math ... sometimes.
 - 3) I have learned that optimization and linearization are very applicable instruments to know.
 - 4) Related rates are all around us.
 - 5) To succeed in math, you **must** be on top of it and understand your homeworks.
-

This class has taught me that you can always know the material better, no matter how many practice problems I do, I can always do [more]. It has taught me to always look for the tricky parts of the wording

of questions because you may not even have to do the math and finally it had taught me to persevere through bad midterm grades. I can always keep trying to do my best.

Prof Butler taught us that by being in this class we will learn to solve problems, problems that have not been solved, that that is why we are here, so that we could learn critical thinking and analytical skills. I have also learned how to master optimization (which I hate) step by step by taking the given and reading carefully. Finally, I learned that one is not born good @ math. It takes practice, practice, practice to master mathematical techniques.

Thanks for a funny/memorable class Butler

- 1) When in doubt, take the 1st derivative and set it equal to zero.
 - 2) Even though you prepare for a final, it can still be incredibly hard/tricky.
 - 3) Calculus is much more useful than precalc, more practical.
-

I have conquered related rates (how fast is something changing in respect to time) and optimization (optimizing something based on its constraint). Also, I've learned that it is easier to solve similar problems by knowing the key concept than to know different formulas and now know what to do with them. Lastly, since professor Butler likes proverbs, I have learned that only a minute amount of my success will be due to my talent; the key factor is rather my effort. Thank you!

I have learned how to take seemingly difficult problems, and make them a group of smaller, less difficult problems. I have learned that it is much easier to take a problem and solve it step by step, instead of trying to solve it all at once. A lot can be learned from this method of problem solving, as it teaches patience, practice and perseverance. Also I have learned that this type of problem solving, can sometimes even be ... fun! I never thought I would say that!

I have learned how to find the area under a curve, how to find the tangent of a line. Both of which are useful [...]. I also learned how to find out how fast the cake batter in my bowl will drop in volume if I know how fast the height is rising in my baking pan. A good skill should ever the need arise.

- 1) I learned the smiley method for second derivatives.
 - 2) I learned about the different formulas for rotating about the x and y axis.
 - 3) I learned that your exams take a lot of studying.
-

In this class, I learned how to manage my time better. I realized that doing my math hw the night before is a really bad idea. I also found that math can be really interesting. Unlike other subjects, math to me seems a lot more interesting and worth studying for. Lastly, I have to admit that I rarely attended my math lectures and discussions because I realized that they were podcasted. However, I realize that the podcasting and actually going to class makes a huge difference. Going to class allows me to understand the class better, and it actually makes me want to do my work.

I can't cram material before midterms.

It's more important to learn/understand the concept and be able to apply it in any way

Keep practicing problems (different types) is the best way to learn. I never went to office hrs for any other class than this; its extremely helpful and I would do it more

As opposed to the AP AB calculus course that I took in 12th grade, which only tested us on material exactly the same or almost the same as the examples shown in class, this course taught me:

1. How to use my understanding of the material, not rote memorization, to solve problems
 2. How to recognize similar patterns in separate problems
 3. How to filter the necessary information in word problems
-

Three things I learned are (1) materials were easy but tests were hard, (2) it's a good idea to review over what I've previously learned in Calc AB, and (3) overall math 31A was a fun class. (especially the visual 😊 😞 😏).

From this course I learned how to solve problems calmly and thoroughly. First make sure where you wanna go, and then walking there. solve problems that [we] encounter one by one. Don't panic there is always a solution. If this doesn't work, try another way to think of the question. Exercising is important. You can't master a course without doing repeatedly exercise. Always exercising keeps the memory fresh. It's a good course!

I have learned that a derivative essentially means the slope of the function. Integration is finding the area under the curve. Both of these principles can be used for economics & can make finding profits (for example) much simpler. It is an extremely challenging subject & truly pushed my limits of knowledge.

One of the most useful concepts I learned is this class was u-substitution. The method made some of [the] more complex integrals easy to solve. I also learned that we are able to take the area between curves by using integrals (subtracting the top function from the bottom). Lastly, I learned that repetition is the key to mastering mathematical concepts.

derivative is the slope of the tangent
related rates use 2 problems
integral finds area

From this class, I have learned valuable skills for future math classes and for my major [...]. I have also learned to stay on top [of] my studying. This class taught me that it is good to always practice to master concepts and work in groups to study for tests.

Professor Butler prepared me well for the rigorous math classes that I will have to take throughout my years at UCLA.

I have taken other calculus classes in the past but I always just memorized the problem types and equations to get the grade. This is the first calc class where I truly came to class to learn the material. It has been a very challenging course but it has really taught me how to problem solve and approach a question. Calculus definitely teaches you how to think about a questions and know how to solve it. This

class has also taught me about patience. Math has always come easy to me but I've had to work hard and not give up [...]

This class has taught me three very valuable lessons: 1. patience and the value of hard work 2. problem solving and 3. the importance of calculus application in real life scenarios. I have taken calculus classes before in high school but I only memorized the equations in order to get a good grade, but I have enjoyed actually learning how to apply what I learn to problems. This class has required a lot of thought and consideration for each problem and I've learned a lot.

By taking this class, I have learned that by taking derivatives (of a graph), we are able to find the tangent line that touches that graph. I learned that we can find the area under curves of graphs, which I find weird but fun. I also learned that by looking at baby animals and cuteness could make bad news "not so bad". + Calculus is hard

The three things I learned this quarter from this class are: how to take a derivative, how to find the area between two lines (slopes), and how to take the function of a line, rotate it, and find the volume of the irregular shape. I also learned that even if I fail this final, Professor Butler will still like me and I will still have a great life.

First thing I've learned is that I can actually apply calculus to (some) everyday life. For example, figuring out how far or how fast something is moving away from me. Secondly, I also learned that I can use optimization and apply that to gardening, remodeling and etc. Lastly, I also learned that math can be fun! (sometimes)

By taking this class, I have learned to further develop my critical thinking skills in mathematics. In calculus, you definitely need to learn how to think outside the box. I learned that everyone is not a perfect mathematician, and no one needs to constantly practice in order to improve their mathematical skills. Furthermore, I learned never to give up and keep pushing/striving for the right answer, regardless if it's wrong, or not, try your best.

I have learned that calculus can be applied to just about anything in life, and that you have to ask the right questions in order to figure out how to tackle a problem and thanks to Professor Butler and you guys (the TA's) I have been able to finally understand integrals and volumes. Thanks!

I have learned about limits, tangent lines and derivatives. I also have learned to find the antiderivatives and how to optimize an area. How to find the rate and volume of certain objects. Also this so far has been the best math class I have taken so far.

During this course I learned more in depth how to integrate functions and apply them to different problems. Also I gained knowledge on the differentiation of functions specially on trigonometric ones. I learned the functions on how to rotate a function making into a geometric shape and with integrals finding its volume.

By taking this class I feel that I have learned to discipline myself while doing simple arithmetic and algebra. I have also learned a great deal about the many applications of math as seen with optimization

and related rates. Furthermore I have learned that there can be many ways to solve one problem but it takes patience to learn where to start.

I've learned new, yet hard materials in this course such as implicit differentiation, related rates, and applied optimization. Though I haven't fully grasp[ed] the idea of these materials, I at least feel confident in the future in terms of familiarizing myself with them. Being introduced to these materials definitely made me realize that just because math is often associated with numbers, it does not necessarily mean that math is easy. Reflecting it to every day life, I realize that math people have it hard too.

I was never a graphing person, but from what I learned in this course, I can easily name and find points on the graph such as end points and critical points as being global max/min. Another thing I learned is finding area between curves by find[ing] its difference and then the antiderivative. Lastly, I learned to work with equations that have more than one variable through implicit differentiation. I was always working on problems w/ just 'x' but w/ this, I worked w/ x and y and finding its derivative.

Apart from learning the [...] common things like $\int_0^1 \sqrt{1-x^2} dx = \frac{\pi}{4}$ or $\int \frac{1}{1+x^2} dx = \arctan x + C$ I have learned some pretty good tips for the rest of my college experience. First off, go to SLEEP EARLY, if you don't you will be dozing off in you 10 o'clock Calculus class the next morning and not have your full attention. Second, now that you are sleepy and did not pay much attention in class STUDY, everyday for at least an hour, and catch up on those homework problems so that when you go to your tutor or TA or Professor you have [questions]. And third of all, but not the least important, go to your TA's & PROFESSOR'S OFFICE HOURS. What good is it to have [questions] if you don't get answers.

P.S. I do know how to count 10 lines, but my writing is too big. Thanks for everything.

I learned how to do optimization problems. I had to also learn how to teach myself math and study for the first time in my life. I was taught how to take failure on a math test as well. I now understand the standard of math at UCLA.

I am retaking this class so there isn't much that I have learned. I am also taking Math 32B this quarter. I don't remember the faces for concavity in my old class so I learned that in this class.

1. Best way to study for math is through practice problems and keep doing different ones over and over again.
 2. If you know it, then you will be fine but if you don't get it, study it.
 3. Math requires a lot of time to study and practice.
-


In this class, I have learned real-world applications of optimization. I have also learned to master the unit circle and the corresponding values of sin, cos, tan, sec, etc. I have learned how to solve problems by breaking them up into several smaller, more manageable problems.

Professor Butler taught me to still love myself even if I do poorly on this final. No matter how hard it is, I still tried my best.

He has also taught me how to think critically rather than memorize formulas because you don't actually learn concepts.

Finally, I also learned that I absolutely have $\arctan x$.

The first and foremost thing I have learned from this class is I am so in the right major! I loved this class and it made me realize just how much I loved math. This was the first math class I ever had a light challenge and it was awesome! I learned that Mr. Butler loves to make very wordy word problems but when you get rid of all of that the solution is staring you in the face. I also learned that helping my roommate with this class every night helped me. So I think I want to become a math teacher. Thank you Professor Butler!

The number one thing that I've learned through taking this class is:  for concavity, it helped a lot w/ memorization.

I definitely understand integrals now (can't say I can solve every problem) but I mean I understand the concept of " \int " which is sum of all the little chunks you cut out.

Third, I learned that you can do a lot of more things w/ linear approximation. At first I just assume you can use it to find the value difference of 26 from 25, but the problem for the last midterm showed linear approximation in a way different way.

P.S. everyday review on the review helped a lot.

I have learned that I should have worked more this quarter for math. I thought I knew Calculus from High School and I was wrong. Butler was a great professor and I should have attended lectures more. Hopefully I pass but at least I have the greatest knowledge of math I ever had, hopefully its enough to pass! Hopefully 31B next quarter!

This quarter I learned that I;m not as good at math as I was in high school. Also I learned that I like math more than I thought I did. And finally, I learned that going to section helps a lot.

- 1) How to get derivatives and antiderivatives
 - 2) How to integrate
 - 3) Math is hard!
-

Three important things that I've learned by taking this class is that it doesn't matter how well you know the material, it's pointless if you can't apply what you've learn[ed] to new problems. Study in advance for exams because there is too much information to try and cram into a few days. Do the homework and practice problems weekly because that is the only way to stay on top of the material that has been covered.

- 1 the relationship between the first & second derivatives and their mins and max
 - 2 how to maximize/minimize an output
 - 3 that the integral from any value to x is the [antiderivative of the]function inside the integral
 - 4 that math can be fun and interesting but you have to put a lot of time and effort or you will not understand
- [..]
-

1. Understanding concepts is very important. Equations are great, but you cannot do much with it unless you understand it and know how to apply it!

2. Math isn't just about plugging and chugging (like it was in high school), calculus is actually interesting to me since there are so much real life applications! (as seen in class)

3. Math is fun! (to some degree) Professor Butler is enthusiastic in his teaching making math actually seem fun. I was asked "are you excited about the final". I answer, "yeah for it to be over", but I was actually curious to see the test and the problems, I was just scared and afraid I couldn't do it and just hoped it would be over soon.

* learned skip problems if you do not understand and come back to it later!

In this class, I learned that the best way to get better at something is through practice & through repetition. I also learned that taking good notes and working through (understanding) the class examples helps me to understand my homework and my exams better. Lastly, I learned that calculus can be fun and interesting as long as you pay attention to Professor Butler!

I learned calculus! Kidding, that is a given.

I have learned that double checking my work is a good idea. One little error can make the entire problem wrong.

I have learned that I need to improve my studying habits. this has always been my weakness. There is always room for improvement.

I learned that there is FREE math tutoring in the M.S. Building—so helpful!!

I learned that math requires patience & repetition. [...] I can honestly say this quarter I used my resources. I'm currently writing this even though it's not halfway through the test yet. I will not give up. Piet Hein once said keep trying and I WILL!

AHH I'm Struggling!!

Three things that I have learned by taking this class is that: you have to learn how to apply the formulas/process in order to fully master the material, life is surrounded by math, and if I ever wanted to maximize my production that I'll attempt at optimization.

I have learned calculus for the first time. I would also like to think I have learned new critical thinking skills that will help me with the rest of my classes, as well as my life in general. I have also learned something that very good mathematicians don't know, and that is $\int \frac{1}{1+x^2} dx = \arctan x + C$.

I learned about both the shell and the washer methods used to find volume when an area is rotated about an axis. I also learned about linear approximation. I learned that the tangent line can be used to approximate the value of it is difficult to find, such as $\sqrt{4.1}$. Finally, I learned about the fundamental theorems of calculus, specially the one stating that the derivative and the integral are inverses of one another.

I learned that one should take time to study and balance his time. I am involved in other things and could never find enough time to study. This doesn't help as i have never taken calculus in high school.

Being thrown into the fire without any experience is really something that has made me more humble. [...]

- I have learned about limits
 - I have learned that math is highly applicable to real-life situations
 - I have learned about integration
-

I have learned how to take a derivative. In the course I learned how to take the antiderivative and I learned how to find a local maximum of a function.

Three things I have learned by taking this course are:

- 1) how to think creatively about solving calculus problems, and apply word problems that are unfamiliar to me to concepts of calculus that I have learned;
 - 2) how to find interesting things like the derivative of distance being velocity and the derivative of velocity being acceleration which can be really useful in real life;
 - 3) and finally, by taking this class I have learned that in order to be successful in math one ought to seek outside help and study with classmates.
-

- College calculus is a lot harder than high school calculus because the tests are much more difficult and the class goes by much faster
 - I learned how applicable Calc is to everyday problems
 - Calc can be fun after you put in the effort to learn it
-

I have never had to work this hard for any math class. From this class, I learned that no matter how hard a problem may seem, I can solve it by knowing when and where to use the right tools. Even though I didn't get the right answer to every problem on this test, I have become a stronger math student. For every practice midterm, practice final, and exam that I struggled on I know that in the end, I was able to apply my math skills at a higher level.

I learned that the derivative and the integral are two major aspects of calculus, $y = \arctan x$ is same as $x = \tan y$, and that calculus is very hard!

I learned ...

A torus looks like a donut.

My simple math (adding, etc.) sucks and screws me over and as Butler said "Students aren't bad at calculus, they're bad at simple arithmetic!"

Also that as much as I studied this still is hard.

Three things I've learned in class are that (1) integrals are very useful in solving real-life problems, (2) I have to work hard for an A, & (3) Professor Butler is a funny guy.

In this class, I have learned how to think critically and how to use the tools I have to solve problems I have never seen before. I have also learned how to better study and ask for help when I am not sure of how to solve a problem.

One of the things that I have learned in this class was the the derivative of $\arctan x$ was $\frac{1}{1+x^2}$. Also I have learned that the $\int_0^1 \sqrt{1-x^2}$ is equivalent to $\frac{\pi}{4}$. One more that that I learned was how to differentiate between a washer and a shell.

Three things I learned taking this class:

- Do not procrastinate on your homework
 - double check your answers on homework and exams for arithmetic errors
 - Do not judge how hard a professor's exam will be based on their personality or you will be screwed.
-

1. I learned that I can improve if I work hard
 2. There is no way to get better without putting the time in
 3. I **can** do Math! (at least **much** better than before ...)
 4. Math is like the fretboard of a guitar!
-

In calculus this quarter, I learned to use the information available to solve problems, study for math or other quantitative reasoning tests, and to expect the unexpected on all exams. I believe these raw skills and ideas will help me in the future in both academic and non-academic pursuits.

- I learned about derivatives ($\frac{d}{dx}(x^2) = 2x$)

- I learned about integrals $\int -\cos x \, dx = \sin x + C$

- I learned that you will still like me whether or not I did well in your class

- Steve Butler can speak some chinese.

1st: 😊 😞 😏

2nd: Professor Butler likes math. (a little too much)

3rd: There is an actual professor at UCLA, still existing today, that can effectively teach calculus to students. Too bad I don't have him for 31B.

I have learned how to approach difficult problems. I have learned to fail by getting a lot of problems wrong before I get them right. And the most important thing I've learned is that you don't get paid to solve problems that have already been solved, and that's why understanding the process and approach to solving a problem is as important (if not more important) than the actual answer.

Three things I have learned by taking this class is how to do optimization, related rates and that I should be prepared to expect random things when it comes to tests.

One thing that I have learned from this class is to finish your math homework by section because the TA's really help you. Another thing I have learned from this class is that even if I do not pass, life will

still go on and I will survive. Lastly, another thing that I have learned from this class is that math is NOT easy, but if you constantly practice you will learn and get better at it.

I learned how to apply what I know and to not depend on memorization to solve the problem. I learned to not give up because if there is a will, there is a way. I learned Prof Butler really loves math and his enthusiasm results in **impossible test**. If I shared the same enthusiasm for math, there would be a possibility that I could solve these math problems with accuracy.

I learned to apply math to real life situations if given the time to do the math and calculations. Also I learned how to prove some volume formulas through integration which is pretty cool. And also I learned most of the stuff I should have learned in high school but was never taught. One important thing I learned was that if you persist on a question eventually you will begin to understand it.

I learned how to actually look for hidden questions within the problem. This class taught me that problems won't always be blatant & out there, but you will have to look for them. Learning the material is not enough. It is learning how to apply the material learned that is the difficult part.

- Steve Butler has a sense of humor
 - seat #'s divisible/not divisible by 3
 - class averages above 50% are a thing of the past . . .
-

Three things that I learned in this class are how to "tackle" related rates problems step by step, how to take a derivative of trigonometric functions, and how to take the antiderivatives of most functions (excluding $\ln x$).

After taking this class I have learned the difference between definite and integral calculus (which I guess is the big picture of the class). I learned that it helps to have a natural math ability, but it is really the practice you put into it that allows you to get better. Lastly, to try and stay more calm throughout the test. Because, for me, when I read the problem and automatically don't recognize it, I panic and do the first thing I think they want. Although I haven't mastered this, I at least recognize it as something I need to work on.

1. Integral
 2. Derivatives
 3. Relations of the above 2
-

- 1) I learned how to apply the math I learn to tricky problems and always try to relate different equations or theorems
 - 2) I learned to pay attention to little details
 - 3) I learned calculus!
-

I learned that although I have acquired a good grasp on all of the basic concepts of this class (limits, derivatives, implicit differentiation (related rates), optimization, extreme values/test, FTC 1/2, etc. etc.),

I have not mastered the material. I can confidently state that I understand all the concepts however cannot apply it to such an advanced level as these midterms and tests. This is not a complaint however, I feel that no one can really master the material in only one quarter. Having taken [...] I can say that whereas I was 100% confused as to how these concepts work and are applied, I am 100% in the know how. Thanks for a good quarter, this class was extremely helpful.

- I've learned how to find the area between two curves.
 - I've learned how to find the "density" of a city.
 - I've learned how to use limits to find rates of change.
-

I learned a lot from this class. I have taken calculus before, but it was confusing. The main thing this class did was help me to understand the areas that confused me before, such as the difference between indefinite integrals and how the derivative and second derivative all relate to $f(x)$. Thanks!

I need to be more organized with my answers. Also, I have learned to apply concepts in ways to think outside the box.

In math 31A I have learned that you have to know your algebra because simple mistakes can cause your answer to be wrong. I have learned how to take the limit of a function. I have learned many concepts and different techniques to solve problems. Some new concepts I learned were derivatives, and Theorems, like the Mean Value Theorem. Math 31A has been a challenge, but I have enjoyed the class because of the professor's personality.

3 things only? I've learned way more than 3 things in this class ... But the most important things I learned is how to think critically and outside the box.

Professor Butler's test questions always throw in some ransom (& interesting) story plots, and that sometimes threw me of guard. But I've learned to pay attention to the core of the questions to figure out what they are asking, then apply my calculus knowledge to solve.

Another thing I learned is when/how to use a certain formula, technique to solve a problem. I definitely learned a lot about the basis of calculus in this class, but I was able to not just learn the fundamentals, but apply the correct technique when necessary.

And lastly, of course, I learned the FTC 1, 2, limits derivatives, and learned how to maximize my time for [the] most efficient, desirable result (optimization), i.e., the problem on [the] practice final: if studying longer means I retain less info, and I get less sleep if I study more, given this eqtn. how long should I study?

After this class, I feel like I look at my [...] classes differently (from a brand new calculus perspective [...]).

I have learned to integrate and the use of the chain rule. I also learned that the second derivative test is used to determine the concavity of a function.

- I learned how to relax and not care so much about the weight of one grade
- I learned a lot of Chinese proverbs
- I learned how to take an integral of a function

I have learned so much about myself from this class. I learned that calculus is not one of my strong points and that I really have to practice the concepts everyday.

I finally learned what a limit was

Also, I have learned how to differentiate and integrate.

I took calculus in high school, but I never truly understood **why** many rules and theorems were what they are. This class was incredibly helpful to my theoretical grasp of both derivatives and integrals, and it helped me see how calculus can be useful in a real world setting.

I learned to find the volume by rotating about an axis, how to solve optimization problems, and got lots of practice on derivatives and integrals.

Firstly, I learned that not all math teachers are boring and dry (and I thank you for that). Secondly, I learned that there are lots of concepts in calculus that I'm going to need to work on in the future. And thirdly, I finally learned how to do related rates!

On, and on top of that, I also learned the bitter taste of failure.

By going to your office hours and asking for help on your practice final test & guide, and by you showing me how clever the problem steps & solution were, I kind of sensed that math is also art & beautiful. This is my last math class ever! And I was glad to take it with you professor.

Thanks Mr. Butler & Jed