Math152 at the University of Tennessee, Knoxville - Chat for May 4, 2016 with the course instructor, Louis Gross.

I will be online starting at about 7:30PM and will be happy to answer questions regarding any aspect of the course, assignments, etc. though for this session I suspect that questions will be mostly about the Sample Final and the recent chapters. You can type in this document to ask questions.

When you ask a question, please do not use your name because this document will be saved and publicly posted after we close it. I will be on-line at least until 8:30PM but will stay on longer if there are still questions. Note that I do not know the identity of anyone posting questions - each participant shows up as “Anonymous” animal.

I am online now - Lou

Dr. Gross can you please do 8a and b?
Thank you sir

I apologize for asking for it again. I should have remembered that

I did 8b on May 2 chat - for 8 a we are asked to find the maximum of the density - that is find the depth at which the function f(x) is maximized. Since we are asked for a maximum, this means

we wish to take the derivative and set it = 0 to find critical points and then check to see if one is a maximum. So we need to find f'(x) = 0 and solve for x and we use the product rule for derivatives to find the derivative

$$f'(x) = 6e^{-3x^2} + 6x(-6x)e^{-3x^2} = 0$$

And when you solve this for x you get $x = 1/\sqrt{6}$
OK?

Hello! I was wondering if you could do #5, specifically part c. And also the integral on #8 part b? Thanks!

For part c, we already have the differential equation $\frac{dx}{dt} = 2 - \frac{x}{200}$ and we just want to solve this for the solution x(t) and use the initial condition that is from part b and is x(0)=100

So to solve this differential equation combine the terms on the right hand side to get $\frac{dx}{dt} = \frac{400 - x}{200}$ and then separate variables which gives you the integrals on the answer sheet. - do I need to go through these integrals? For example the integral on the right hand side is $\int \frac{dx}{400 - x} = -ln(400 - x)$ and the other integral gives t/200 so set these equal and you get the answer on the sheet by raising e to both sides.

You asked about the integral in 8 (b) which you find by substitution by letting $u = -3x^2$ so that $du = -6xdx$ and when you substitute you get $\int -e^u du$ where when you integrate this you get $-e^u$ and plugging in what u is in terms of x you get $-e^{-3x^2}$ and the upper limit is 1 and the lower limit is 0 for this and plugging these in you get the answer on the sheet.

For #1a, how are we supposed to find W'(a)? Is the definition of the instantaneous growth rate something we just need to memorize?

This is the definition of the derivative of a function and yes you are supposed to know what it is - you can look back in the text on page 328 which gives two different forms for the derivative of the function f(x) and both are equivalent as is shown on these pages in the text.

Could you do 10a please?

For 10 (a) we need to use the integration by parts formula since substitution is not going to help us at all. You can see this as well by noting that the integrand is a product of two functions and

when I take the derivative of one of them (the 3x term) it simplifies alot (it becomes just 3). So the logical thing to try is to use the integration by parts formula $\int udv = uv - \int vdu$ Where we let $u = 3x$ so du = 3 dx and $dv = e^{-4x}dx$ so we need to find v and this is $v = \int e^{-4x}dx = -\frac{1}{4}e^{-4x}$ so the integral is found by plugging these into the integration by parts formula to get

$$\int 3xe^{-4x}dx = 3x(-\frac{1}{4}e^{-4x}) - \int 3(-\frac{1}{4})e^{-4x}dx$$

And so this becomes $\int 3xe^{-4x}dx = -\frac{3}{4}xe^{-4x} - \frac{3}{16}e^{-4x} + C$ which is the answer on the sheet

Could you work out 4c and 4d?

I did all of 4 on the May 2 chat - is there something you don't understand?

Can you show me how to find the integral on 8a?

I think you must be looking at a different problem - 8a doesn't involve an integral and I worked out the answer above

Can you work out 9 and 12d please??

I'm not sure what more I can say about #9 beyond what is on the answer sheet where I went through the complete answer. What is there you don't understand about this one?

For 12 d note that we are asked to find out conditions under which B'(a) is maximized so we want to set the derivative of B'(a) equal to 0 and find when this holds. So you are finding B"(a) and the answer sheet works this out using the product rule. Then when this = 0 the only way it equals zero is if B=K/2

Will you do 8b?
I did this on the May 2 chat - is there something you don't understand?

Number 3 please

For this problem we separate variables and integrate $\int \frac{dy}{y} = \int (2t+1)dt$ which gives $ln(y) = t^2 + t + C$ so that $y = e^{t^2+t+C}$ and then since y(0)=4 this means that $4 = e^C$ and this gives the answer on the sheet

Where are the answers for additional in class problems?
These were in-class problems - I went over them in class and didn't write up solutions - I think there are photos of the Boards that have them.

Regarding credit for work shown, if we write out graphs or diagrams of what our equations look like, could that give us any form of credit or be potentially useful?

This would be appropriate for some problems of course - if you were asked for a graph of a function then of course it would as it would if you were asked to find out whether a critical point gives a maximum or a minimum or not. In general if you have a definite integral to find (that is an integral with explicit limits) then it would be helpful to graph the function you are integrating. This is also true if you want to find the area between two curves.

One last question sorry, should we review the sample 1,2,3 exams as well for potential problems on final? Ok, thank you very much for all the help and assistance with the online sessions. Good night

It wouldn't hurt at all especially if there was a problem on these that you don't understand and if you did poorly on the exam itself then you should certainly review the sample exam as well.

I don't see anyone online now so I am going offline - OK good night - Lou (I'll save this chat and post it to the website tomorrow)