Math 152 at the University of Tennessee, Knoxville - Chat for February 29, 2016 with the course instructor, Louis Gross.

I will be online starting at about 9:30PM and will be happy to answer questions regarding any aspect of the course, assignments, etc. though for this evening I suspect that questions will be mostly about the upcoming exam and the project assignment. 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 10:30PM 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.

Folks,
I am logging in briefly from dinner with a job candidate. I will be on later but can’t do much now - will be at least another half hour. Sorry - plane was delayed.
Lou

no worries enjoy dinner

I am now back online - Lou

Dr. Gross, during class, you had said that the equation for #4 was the sum of ((N/4)(N/4-1))/(N(N-1). I was wondering how you derived that? Thank you!

What I said was that this was the case in which each of the 4 species present had the same number of individuals in them - so each had N/4 individuals because there are a total of N individuals across all 4 of the species. I got this by plugging for ni the value N/4 and then summing over all 4 of the species to get D - note that SID is 1-D

OK?

Okay, thank you. Does this function differ from the one in #3?

Could you please explain how to do #8 on the Sample Exam?

Not sure which part you want - I'll do (a) in this case the problem is to find first the derivative h'(2) and h'(x) = 3x^2 /4 +1 = .75x^2 + 1 so h'(2) = 3+1 = 4 which is the slope of tangent line to the graph of h(x) at x=2 and the point on the graph is (2, h(2)) = (2, 4)

so the equation of the tangent line is

y-4 = 4(x-2) or y=4x - 4

OK?

Could you explain how to do #6 on the practice exam, I get to the second derivative and don't know what to do? Thank you

You didn't say which part - suppose I do 6 (b). The first step is to get the derivative g'(x) and then from this the second derivative g''(x)
so g'(x) = 12 x^2 + 10 x + $1/2\sqrt{3}\ x^{-3/2}$
and then
g''(x) = 24x + 10 - 3/(4$\sqrt{3}$) x^(-5/2)

oops this is indeed 7 (b) and all I asked for was the derivative

For 6 (b) g'(x) = 12x +3/x and then g''(x) = 12 - 3/x^2

and the inflection points could occur where g''(x) = 0 so in this case 12 - 3/x^2 =0 means that x = ½ or x = -½

so the possible inflection points are at these x values. You can do a sign chart for g''(x) and see that for x < -½ that g''(x) > 0 so g(x) is concave up however looking back at g(x) we see that g(x) is not defined for x ,0 so this case doesn't matter.
for 0< x <½ then we also need to check and we see that g''(x) <0 so g(x) is concave down and then for x>½ we see that g''(x) >0 and so g(x) is concave up. So the only inflection point is at (½, 3/2 +3 ln(½)) = (½ , 3/2 -3 ln2)

OK?

is this number 7 you're doing here? someone asked about 7 further down, sry,
Could you please explain #1 a, b and c.

each of these parts of #1 involve first finding the derivative of the functions, doing a sign chart to find where any relative maxima or minima occur, finding the second derivative to find out where the function is concave up or concave down by setting the second derivative =0 to get any inflection points. Then look for places the function blows up or down by looking where there is a zero in the denominator, and take the limit as $x \to \infty$ to find any horizontal asymptotes

how do you determine in #1 c the asymptote of the line y=x+2

Note in this problem that the other term has an x in the denominator so that as $x \to \infty$ that term gets smaller and smaller - what is left is the x+2 term so as $x \to \infty$ the graph gets closer and closer to x+2 and the same thing happens as $x \to -\infty$ *so that says the graph is asymptotic to* $y = x + 2$ *as x gets large and as x gets very small*

Could you explain #2 on the sample exam?

I think I did this on an earlier chat - you did.

It is posted at
http://www.nimbios.org/~gross/math152spring2016/Math152ChatforFebruary25.pdf
whoops, imma take this down, sry

it also has #5 there.

Could you please go through (or even give a hint) on how to start number 4 on the project (on page 301)?

I think I went through this part of the project in class - yes it is in the first photo from class today

was that for number 4 on page 300 or number four on page 301?

Sorry - it was #4 on page 300 - for #4 on page 301 you first need to write down what the SID(S,n) means - it is 1-D from page 300 with the assumption that this means there are S species with each of them having exactly n individuals present.
So if you write this down you get something very similar to what we did in class for #4 except that there are S instead of 4 species present - so where we had a 4 in class is replaced with an S. Then the problem asks you first to take the limit as N goes to infinity and then as S goes to infinity and for the second part the reverse of this.

i was confused which it was related to.
Could you go over #3 a and b?

For these we need to first calculate the value of the function at the two endpoints of the interval and then find the critical points by taking the derivative and setting it =0 and finding the function value at each of the critical points. So for 3 (a) f(1) = 5, f(3) = 4 ⅓ and f'(x) = 1 - 4/x^2 so the critical values are x = 2 and x= -2 but only x=2 is inside the interval so f(2) = 4 and the maximum occurs at x=1 with function value 5 and the smallest value is at x=2 with function value 4.

You do 3 (b) similarly

Could you go over #3 on the project of page 300? I'm confused if there is a difference in the equations used.

We did this in class too - at least we wrote the formula down since it is the same formula as for part 4 except that in part 4 we let n get very large so it is actually shown in the first photo of the board from today.
Okay, so does little *n* not play a role in #3?

Since there are N total number of individuals with exactly the same number in each of the 4 species, n = N/4

make sense?
Kinda, When I solved #3, I got 4n(n-1)/ 4n(4n-1) and then simplified. Would I just plug in N/4 for *n*? So sorry for so many questions.

Right - I think what you did is OK - you just are defining N=4n which is perfectly fine. So what you have is correct and for #4 you can use your equation (it is for D though, not SID = 1-D) and let n go to infinity - it should produce the same result as letting N go to infinity as I did it in class.

Okay, thank you so much!

could you do all of number 5?? i don't even know where to begin

I discussed #5 on the Chat posted at
http://www.nimbios.org/~gross/math152spring2016/Math152ChatforFebruary25.pdf
Are there still questions?

Im confused about how to manipulate the equation to neglect the variables a and b and then do we use the product rule to derive the rest?

Yes, the a and b are just constants - treat them the same way you would if they were 2 and 5 for example - just keep them around and use the product rule. You aren't neglecting them at all - you just keep them in the equations as if they were fixed constants whose value you knew.

Can you do number 8 b?

For this we find a point on the graph at x=2 by finding g(2) = $cos(\pi/2)$ =0 so the point on the line is (2,0) and then take g'(x) and evaluate it at x=2
$g'(x) = -\frac{\pi}{4}\sin(\frac{\pi}{4}x)$ so $g'(2) = -\frac{\pi}{4}$ which is the slope of the tangent line so the equation of the tangent line is y-0 = $-\frac{\pi}{4}$ (x-2)

Will there be extra credit opportunities for this course like there was in Math 151?

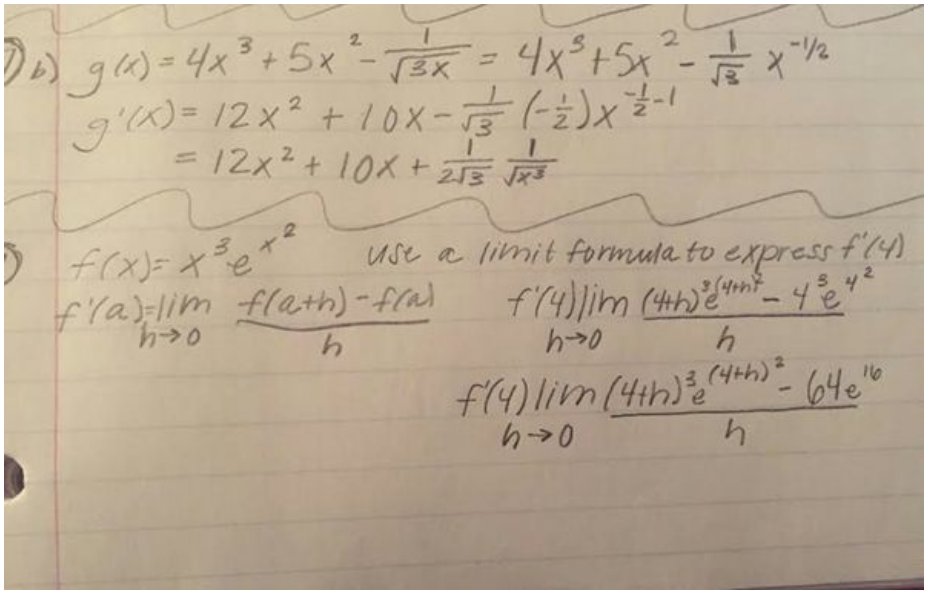
Yes I will give opportunities for these though I will not allow you to use for example the same modules you might have done for 151 to count again.

What equation would you use to calculate problem #4 on the sample exam?

I went over this in detail in class today - it is shown in the 3rd and 4th photo posted from today's class

Could you please explain #9?

I did this in class but I don't have a photo of it. You can use the definition of derivative
$f'(4) = \lim_{h\to 0} \frac{f(4+h)-f(4)}{h}$
i have a picture of #9 from class if you just want me to post that here



yes please post it here
If you have time could you please go over number 5 on the project?

This is just like the answer I gave above - I'll copy it here

So if you write this down you get something very similar to what we did in class for #4 except that there are S instead of 4 species present - so where we had a 4 in class is replaced with an S.

Could you also explain how we need to calculate the limits of question 4 on page 301. this section has confused me.

I tried to answer this above - I'll copy it again
for #4 on page 301 you first need to write down what the SID(S,n) means - it is 1-D from page 300 with the assumption that this means there are S species with each of them having exactly n individuals present.
So if you write this down you get something very similar to what we did in class for #4 except that there are S instead of 4 species present - so where we had a 4 in class is replaced with an S. Then the problem asks you first to take the limit as N goes to infinity and then as S goes to infinity and for the second part the reverse of this.

thank you.
Can you do number 6 a please?

For 6 (a) you first find the derivative f'(x) and then the second derivative f''(x) and for each of these you need to use the product rule.
So f'(x) = 2x e^(-x) - x^2 e^(-x) = x e^(-x) (x-2)
and then take the derivative of this to get the second derivative

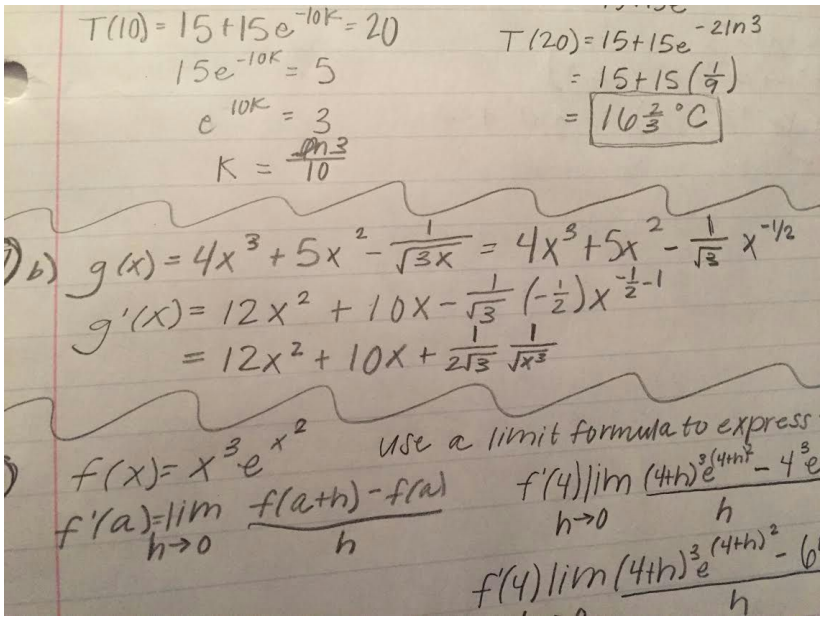
f''(x)= x e^(-x) + (x-2) (e^(-x) -x e^(-x) and simplify this to get
f''(x) = - e^(-x) (x^2 - 4x + 2) which has roots x = 2 + $\sqrt{2}$ and x = 2 - $\sqrt{2}$ and then use these and a sign chart for f''(x) to find the inflection points.

Can you do last problem on project?

I discussed this above - unless you mean writing up the report?
I'll recopy my response here

for #4 on page 301 you first need to write down what the SID(S,n) means - it is 1-D from page 300 with the assumption that this means there are S species with each of them having exactly n individuals present.
So if you write this down you get something very similar to what we did in class for #4 except that there are S instead of 4 species present - so where we had a 4 in class is replaced with an S. Then the problem asks you first to take the limit as N goes to infinity and then as S goes to infinity and for the second part the reverse of this.

Could you do both of number 7?47



this is 7 A&B from class today

Lou did number four during class today (on the project) not the four on page 301ohhh my bad
Can you do the inflection points of 1b?

You need the derivative which is
f'(x) = 4x / (x^2 +1)^2

and take the derivative of this to get

f''(x) = -4 (3 x^4 +2 x^2 - 1) / (x^2 + 1) ^4

and then set the top = 0 to see that the inflection points are as listed on the answer sheet

Thank you for your help.

What needs to be done for the report part of the project? What are you looking for?

As it says - a one page report, listing each of the parts and what your answers are to each part

can it be longer than 1 page? Thank you.

Sure - but I don't think it should take too much typed space -= oh I see - you aren't using a technical word processor to show the equations - so it may well take more than a single handwritten page which is fine.

Would we do the same for #5 on the project as we did for number 4 (on page 300)? Oh, ok. Thank you Dr. Gross

#5 doesn 't ask for a limit - you just give the formula and simplify it

I'm going to go offline now - good night all.