Math152 at the University of Tennessee, Knoxville - Chat for May 2, 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

Can you go over number 4 on the sample exam?

For this, the first step is to remember that a probability density function has integral = 1 so to find the α in the function g(x) you need to integrate g(x) from 0 to 1 and set this equal to 0. This is what the answer sheet show - so $\alpha = .5$ is the value.

Part b asks for the probability that the random variable having this pdf is less than or equal to .5. To find this take the integral from the lowest possible value the random variable can take on (0 in this case) to the value you want (.5 in this case). That is what the answer sheet shows because the integral is $\int (.5 + x)dx = .5x + .5x^2$ and plug in .5 and subtract what you get when you plug in 0 to get the answer on the answer sheet.

Part c asks for E[X] which is by definition the integral on the answer sheet so you integrate to get the answer.

Part d asks for the median so you set the integral up to m = .5 and find the m value that works.

Do you need me to go over how to find any of the integrals here or on the sheet?

Can you do number 6 on the sample exam? Also, if we do not show our work on the final, but get the right answer will points be deducted?

First, regarding work on the Final, it is always best to show your work so that if you have some mistake I can give partial credit. I need to have some idea how you got an answer even if this is "I plugged this into my calculator and got ..."

I went over #6 today in help session - set the derivative = 0 to find equilibria - in this case you get N=0 or $N^2 = 1$ so N=1 or n=-1 but N=-1 is nonsense biologically so there are only two equilibria, N=0 and N=1. Then to find out whether each of these is stable, you check the derivative dN/dt in between these (e.g. for an N value between N=0 and N=1) and for an N value bigger than N=1. So for example if you let N=2 then dN/dt=4/5 - 2 <0 so the N values are decreasing when N=2 so you move towards N=1. Similarly if you let N=1/2 then dN/dt=1/(5/4) - 1/2 > 0 so N is increasing at N=1/2 and the solution for N moves away from 0 towards N=1 so N=1 is stable and N=0 is unstable. This is also easy to see from a sign chart for dN/dt

Could you explain how to do 8b on the sample final?

Here we want to take the integral from the top of the ocean (height zero) down to depth 1 meter, and we are integrating the density of the organism which is given. So when you do this you get the integral on the answer sheet. You use the substitution method to find the integral - do you want me to show that?

Can you explain number 11a from the sample final please?

Here we want the derivative of a product f(t)g(t) where f(t)=4t and g(t) = ln(2t+1) so you use product rule
Which says that this is f'(t)g(t)+f(t)g'(t) so you find each of these derivatives and plug it into the product rule formula. Do you want me to go through how to find f'(t) or g'(t) ?

Could you work number 12, all parts please?

First when you see "long-term" think of this as the limit as time goes to infinity. So for the first part we want $\lim_{a\to\infty} B(a)$ and to find this use the rules of limits of a quotient - being the quotient of the limits. The top is a constant (1500) and the bottom gets closer and closer to 10 since the $e^{-a/10}$ term gets closer and closer to 0 as a increases. So $\lim_{a\to\infty} B(a) = 150$
So K = 150

Part b asks for the growth rate of stand biomass - so it is a derivative of B(a) - this gives the rate of change of B. So take the derivative of B to get the answer on the sheet. Do you need me to go over how to find this derivative - it is found by realizing that the bottom is raised to a power so use the power rule with the bottom = u and then the derivative you are finding looks like the derivative of 1/u which is -2/u^2.

Part c asks when the stand has ½ the long term biomass - since the long term biomass is 150 you set B(a)=75 and solve for a.

Part d asks you to show that B'(a) is maximized when B(a)=K/2 and so to do this you need to show that B''(a) = 0 when B(a) = K/2 so first find B''(a) by taking the derivative of the formula you were given for B'(a) - take this derivative with respect to B not a) and you'll get the formula on the answer sheet and then plug into the formula you just got for B''(a) the value K/2 for B and you'd see that you get 0. Then you really should check to make sure this is a maximum not a minimum - but here this is easy since when you look at the formula you got for B''(a) you see that it is positive for B<K/2 and negative for B>K/2 so B=K/2 must be a maximum.

10b please! I got ½ as an answer on the sample final, and I cannot figure out where I messed up.

For this there are two pieces of the integral $\int 4x dx = 2x^2 + c$ and the second part is $\int sin(2\pi x)dx = -1/2\pi cos(2\pi x) + c$ so you take each of these plug in ½ and then subtract what you get when you plug in 0. For the first part we get 2 (¼)= ½ and for the second part we get $-(1/2\pi)cos(\pi) + (1/2\pi)cos(0) = 1/2\pi + 1/2\pi = 1/\pi$

OK?

Could you go over 1b?

There are several ways that are reasonable to estimate W'(2) so you just need to state what you are doing. On the answer sheet one way to do this is to average the slope of the curve just before a=2 and just after a=2 - this is the way we discussed averaging rates of change. So in this case looking at the graph it looks like W(1) = .2, W(2) = .4 and W(3)=.7 at least approximately. Then we can find an approximate answer for W'(2) by taking the averages of teh secant lines before and after a=2 or

$\frac{1}{2}$ ((W(2)-W(1))/(2-1) +(W(3)-W(2))/(3-2)) = $\frac{1}{2}$(.2+.3) = .25

OK?

Can you do 12 please? Oh, sorry I didnt see that
It is above

Could you also do 7 please?

The first part of this is to sketch a graph to see which function is above the other - when you do this you can see that both graphs go through the point (0,0) and the point (2,8) and that the graph of y=2 x ^2 is below the graph of the line y=4x on this interval (for x between 0 and 2). So to find the area you take the integral of the upper function minus the lower function over the interval from 0 to 2. This is the integral on the answer sheet. OK?

I am going offline unless there is some other question. You can also email me if you'd like to come by my office over the next 3 days.