Quiz #2 Review for math 212

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Hey kids! This is Rosie, the housekeeping robot from the Jetson's here to give you advice regarding your upcoming quiz in Math 212 on November 1st. BEEP! Recently, Corey visited the future for a job interview with that punk Mr. Spacely, and stayed with us. I overheard some of their interview, and found out some interesting information regarding your quiz and felt the need to share it with you. Mr. Spacely thinks Corey is an idiot, and Corey didn't get the job. But let's not be hard on him, he's being judged by future standards.

1. Section 5.3: Inverse functions. This section is a good section for you all. See, it's one of those sections where Corey really doesn't want to ask much about, but some of the future development of the class depends on the information contained therein. BEEP BEEP! Really, for this class, there are three important things to remember from this section. First, inverse functions need not always exist, but almost all the time you and I could make the domain a little smaller so that said function does have an inverse. Second, you should know how to find an inverse, should it exist. Of course, lots of times functions' inverses are difficult to find, and Corey wouldn't ask you about anything like that. But knowing the process is important (do be careful to keep in mind the domains in question are very important!) Third, and finally, BEEP, the whole point of this section is to provide a method for finding derivatives of functions whose definitions are as inverse functions. The best and first example is the exponential function e^x. As we defined it, it's the inverse of the ln function. Armed with only that information (and in my case, semi-hexagonal clasps for hands)

we are somehow able to find its derivative. I would suggest you know that derivative (Hint: $(e^x)' = e^x$). Then, learn the corresponding integral formula, and work the heck out of it (translation: be able to answer the kinds of problems we learned about before (from this class and math 211), but with regards to the new functions we're learning about). See problems 33-64 of section 5.4 for examples of that. More specifically, though, when looking at the homework, focus your efforts on the ones that Corey has assigned – after all, it seems like he spent a lot of time figuring out exactly what questions to ask you, so it's likely he'd ask quiz and exam questions that are similar to those. He doesn't want to waste your time.

2. Section 5.4: Exponential functions, derivatives and integrals. In this section, all we learn is that $\frac{d}{dx}e^x = e^x$, and $\int e^x dx = e^x + C$. We sort of already knew that. BUT: what's hard for you guys is that you have to go back and answer questions like number 47 from this section:

$$\text{Compute the derivative of } F(x) = \int_{\pi}^{\ln x} \cos(e^t)dt\,.$$

Remember, though, that's all these questions are. It's the same process with different functions involved. You know how to do these questions already, just include the new info regarding derivatives and integrals of these new functions into your brain and you'll be able to do them. BEEP!

3. Section 5.5: Bases other than e and other applications. This section is identical to the previous section, except we study the derivatives and integrals of exponential functions with bases other than e. I'd just remember that for any $a > 0$,

$$\frac{d}{dx}a^x = (\ln a)a^x, \quad \text{and} \quad \int a^x dx = \frac{1}{\ln a}a^x + C\,.$$

4. Section 5.6: Inverse trig functions: Differentiation. Similar to section 5.4 when we learned the derivative of an inverse function, in this section we learn the derivatives of other functions that are defined as inverse functions, this time, as inverse functions of trig functions. We'll compute the derivative of arcsin, arccos, and arctan. Remember them. These derivatives will complete our foray back to Math 211, and the differentiation rules that I would want you to know by heart are found nicely displayed in a chart on page 376, just beneath a picture of Galileo. Corey certainly doesn't look like that when he's thinking about math. He looks a little more helpless, but hey, I guess we're all stuck with him. Yes, you need to know what's in this chart (except entry 8, 11, and 22-24), but please keep in mind that these derivatives weren't just handed down from some devine being and given to us to memorize and try to understand. Those derivatives in the chart are conclusions drawn from basic differentiation techniques. To tell you the truth, all I ever remember is the sum rule (2), the product

rule (3), the chain rule, the power rule (6), and the derivatives of e^x, $\sin x$ and $\cos x$. The rest is something I could derive if I had to, and I suggest that you try to adopt this approach. Of course, even though I'm a futuristic robot, for some reason I was given a very small memory and the body of a 1960's can opener. And somehow I found my way into the housekeeping profession. So maybe I just remember a few facts and a few methods and that's how I get by. If you must memorize these, then I suggest you do. That knowledge will be very helpful as time goes on.

5. Section 5.7: Inverse Trig functions: Integration. The only thing in this section are the corresponding integral formulae from the derivative formulae we found in the previous section.

6. General suggestions: I think you should study for this quiz. Corey really doesn't like surprises, and I think that it's extremely unlikely this quiz (and midterm) will be anything but straightforward. I can't emphasize enough the importance of practicing. Really, the more you practice, the easier this stuff will become, and the more confidence you will have walking into the quiz and subsequent exams. As always, if this review sheet isn't enough, feel free to drop by Corey's office hours (or by appt) and he can help you out. BEEP! Oh, and

Rock on!!!!