Review sheet for 3rd exam

The third exam will cover sections 7.4, 7.6, 7.8, 8.1, 8.2 and 8.3. You should review the problems from Assignments 8, 9, 10, and 11; and Quizzes 5 and 6. I recommend trying to do similar problems (you can easily recognize which problems in the text are similar to the ones I assigned), without help from anyone, as a check on whether you're ready for the test. (There was a problem from section 7.5 on one of the assignments, but this type of problem will not appear on this exam.)

Here is a guide to which portions of these sections will and will not be covered on the exam.

7.4 Derivatives of logarithmic functions. Most of this section was already covered on the second exam. Of course, you should still know what is in this section for the third exam, since otherwise you won't be able to do many of the problems from later sections. But more specifically, the exam might contain a problem involving logarithmic differentiation: see pages 417–418.

7.6 Inverse trigonometric functions. It's worth reviewing the entire section, but you can skip Examples 2 and 6 if you like. Example 3 is especially important for what comes later in section 8.3. You should memorize the formulas for the derivative of the arcsine and arctangent functions (see the box at the top of page 459) and the corresponding formulas for integrals (see boxes 12 and 13 on page 460). You will not be asked to prove the formulas for the derivative of the arcsine and arctangent functions on this exam.

7.8 Indeterminate forms and L'hopital's rule. You should review the entire section, except skip Cauchy's Mean Value Theorem (p. 477) and its proof. I'm not too likely to ask questions like Examples 9 and 10, but I think it pays to read these examples anyway.

List of Integrals. On p. 488 there is a convenient list of all the integrals you should know for the exam. Actually, you can omit from this list the integrals of $\csc x$, $\csc x \cot x$, and $\cot x$, as well as those of the hyperbolic functions $\sinh x$ and $\cosh x$ (we haven't covered hyperbolic functions in this class).

8.1 Integration by parts. Review the entire section, except you can skip Example 6. You should memorize the integration by parts formula $\int u \, dv = uv - \int v \, du$.

8.2 Trigonometric integrals. There are a lot of rules in this section in red boxes, but I don't recommend memorizing any of them. Instead, just read the examples carefully (you can skip Example 9). If the formula for the integral of $\sec x$, or the formulas $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$ or $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$ are needed for the exam, I'll supply them to you on the exam, but it certainly doesn't hurt to memorize them.

8.3 Trigonometric substitution. This section would be better titled "Inverse Trigonometric Substitution", to reflect the fact that the substitutions here do not involve setting the new variable u equal to a trigonometric function of the old variable x (e.g., $u = \sin x$), but the other way around: the old variable x is set equal to a trigonometric function of the new variable θ (e.g., $x = \sin \theta$). You should review the entire section, or better yet, try doing some of the problems at the end of the section which weren't assigned. Remember that the answers to the problems should be functions of the original variable x; to change from the new variable θ back to x it is often useful to draw a diagram like the ones in figures 1, 3, or 4.