Final exam: Some problems for review

The exam will be held in class (Badgley 146) from 10 AM to noon on Thursday March 23. The material covered is Section 5.3 - 7.2, excluding 5.5 and 6.5. It is a closed book exam. A 4" x 6" hand-written single-sided note card is allowed. The table of integration on References 6-10 in the back of the textbook is allowed. A scientific calculator is allowed. Graphing/programmable/transmittable calculators are not allowed.

You should review the homework problems, worksheet problems, examples given in the textbook and in the lectures. It is always a good idea to study for the exam with someone. The types of problems you may be asked on the exam include:

- Take the derivative of the exponential functions, logarithm functions, trigonometric functions, inverse trigonometric functions, hyperbolic functions, and combinations of them.
- Use L'Hospital rule to find limits of indeterminate forms.
- Find definite integrals using substitutions or integration by parts.
- Integrate a rational function using partial fraction decomposition.
- Find integrals with the aid of the table of integration.
- Find improper integrals.
- Find the area of a region using integrals.
- Find the volume of a solid of revolution.

Additional problems to practice:

1) Simplify

   (a) $\ln\left(\ln e^{e^{10}}\right)$

   (b) $e^{x-2\ln x}$

   (c) $\log_3\left(\frac{1}{27}\right)$

   (d) $\arccos\left(-\frac{1}{2}\right)$

2) Find the derivative of the following functions:

   (a) $f(x) = \sqrt{1+xe^{-2x}}$

   (b) $f(x) = 10^{x^2}$

   (c) $(\sin x)^{\cos x}$

   (d) $\arctan(e^x)$

3) Find the following limits.

(a) $\lim_{x\to 0} \dfrac{x3^x}{3^x - 1}$

(b) $\lim_{x\to\infty} \left(1 + \dfrac{2}{x}\right)^x$

4) Find the following integrals using integration by part or substitution or a combination of both.

(a) $\int \sin(x)\cos^2(x)dx$

(b) $\int x \ln x dx$

(c) $\int x \sin(2x)dx$

(d) $\int \sin(\sqrt{x})dx$

5) Evaluate the integral

$$\int_2^3 \frac{x^4 - 1}{x^2 - x}dx$$

6) Use the Table of Integral to find

$$\int \frac{x^2}{\sqrt{3 - 4x^2}}dx$$