Math 126: Practice Exam 2

1. Let $f(x) = \sqrt{x}e^x$. Determine the volume of the solid generated by revolving the area under $f(x)$ between $x = 1$ and $x = 5$ about the x axis.

2. Prove the formula for the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, Area=$\pi ab$.

3. Determine
$$\int \cos^3(x)\, dx$$

4. Determine
$$\int \frac{2x+1}{x^3 + x^2}\, dx$$

5. Determine
$$\int x \arctan x \, dx$$

6. Give strategies for each of the following integrals. In each case, state the methods and any substitutions you would use.

    (a)
    $$\int \frac{x^2 + x}{x + 2} \, dx$$

    (b)
    $$\int \frac{x^2}{(4 - x^2)^{3/2}} \, dx$$

    (c)
    $$\int \frac{\sec^6(2x)}{\tan^2(2x)} \, dx$$

7. Determine
    $$\int_2^\infty \frac{1}{x^2 - 1} \, dx$$

8. Use the comparison test to determine whether
    $$\int_3^\infty \frac{1}{x \cos x} \, dx$$
    converges or diverges.

9. Why is Simpson's Rule so much more accurate than other methods of approximating integrals?

10. Set up, but do not evaluate, the integrals necessary to determine the arc length and the surface area of the curve and solid in problem 1, and of the curve in problem 2.