Math 2924 — Review for Final Exam

To study for the final exam, you can use the review sheets for the three midterms for material from chapters 6, 7, 8, and 11. Below I've written a little review material for chapter 10. Chapter 12 is not covered on the final exam.

For the final exam, you should still know the definition of the number e and the proofs of the formulas for the derivatives of e^x, $\ln x$, $\arcsin x$, and $\arctan x$ (see the review sheet for Exam 1).

The other comments on the review sheets for the first three exams about what you should know also hold for the final, with the following exceptions:

• On the final, there might be some limit problems in which you have to first change the limit to one of type $\frac{0}{0}$ or $\frac{\infty}{\infty}$ before using L'hopital's rule. For example, in finding $\lim_{x \to 0+} x \ln x$, which is of type $0 \cdot \infty$, you first have to put the limit in the form $\lim_{x \to 0+} \dfrac{\ln x}{1/x}$, which is of type $\frac{\infty}{\infty}$, and then use L'hopital's rule.

• I won't ask about moments or centroids on the final exam.

• You should remember the formulas for arc length:

$$L = \int \sqrt{dx^2 + dy^2} = \int \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx = \int \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt.$$

• You won't need to remember the formulas for area and arc length in polar coordinates. (But hopefully after having done problems using these formulas you'll be familiar enough with these formulas that you've almost memorized them anyway.)

10.1. This section explains what parametric equations for a curve in the plane is, and gives some examples. You could look at Examples 1, 2, and 7 (which we discussed in class).

10.2. This section discusses how to find dy/dx and d^2y/dx^2 for parametric curves, and how to find areas enclosed by parametric curves and arc lengths of parametric curves. You should review the whole section.

10.3. This section explains what polar coordinates are. You should read from the beginning of the section through Example 9.

I didn't assign problems in class like Example 9. But this example makes an important point, which we did discuss in class: namely, that you can treat a polar curve $r = f(\theta)$ as a parametric curve, in which θ is the parameter, and x and y are given as functions of θ by $x = f(\theta)\cos\theta$ and $y = f(\theta)\sin\theta$. So anything that you can do for parametric equations, you can also do for polar curves.

10.4. You should read the entire section.