Review 3

This review is meant as a general overview of SOME of the topics covered in class up to date. The test questions will not only cover this material but will also cover sections 3.6 & 3.7, 4.1-4.6, and implicitly all previous material. The extra credit problem will be on parametrization and section 3.5. You should know all definitions, theorems and techniques outlined in the text, and be comfortable with the properties and examples throughout the above sections as well as know how to solve the exercises and homework problems. Below I provide some sample problems that cover material from class. I am in no way promising any of these problems will be on the test. They are solely for practice. Other good sample problems can be found in your homework assignments, lecture notes, and class handouts, as well as the before mentioned places. Another great option is the Review Exercises at the end of chapter 4.

(1) Compute the derivative $dy/dx$.
   (a) $yx + x^2 = 9y$
   (b) $\sin(yx) = 1$
   (c) $y + 3yx^2 = 2x$

(2) Compute the following limits.
   (a) $\lim_{s \to 0} \frac{s^3 \cos s}{s^2 + \sin s}$
   (b) $\lim_{t \to \infty} 2x \sin(1/x)$
   (c) $\lim_{t \to \infty} \frac{x}{2 \sin(1/x)}$
   (d) $\lim_{x \to 5} \frac{x}{\sin(5-x)}$
   (e) $\lim_{x \to 0} \csc x - (x + 3)^{-2}$
   (f) $\lim_{x \to 0} (1/x - 1/\sqrt{x})$

(3) Determine the parametric equations that describe the right half of the ellipse $x^2/4 + y^2/9 = 1$ traversed in the clockwise direction. What changes if you want to traverse the half ellipse in the counter-clockwise direction?

(4) Graph the equation $f(x)$ without a calculator.
   (a) $f(x) = 4x^3 - x^4$
   (b) $f(x) = x\sqrt{10 - x^2}$
   (c) $f(x) = \frac{x^3 - 4}{x - 5}$
   (d) $f'(x) = x^2(x^2 - 12)$

(5) Prove the function $r(\theta) = \theta + \sin^2(\theta/3) - 8$ has exactly one zero on the interval $(-\infty, \infty)$.

(6) Do the optimization problems found on pages 320-321.

(7) Do the related problems found on pages 238-239.

(8) Check the Practice Exercises beginning on page 318.