Math 263A **Guide for the Final Exam**

The final exam is on Monday, November 19, at 7 p.m. in our regular classroom. Calculators are not permitted. This is a common final with all students taking 263A. I asked if students could take the exam early, and the coordinator responded: "No!!!! Make-up exams for common finals are only given in case of conflicts, following the rule outline on the Registrar's web page." You can contact the coordinator at `math263coord@math.ohiou.edu` to try to change his mind.

All material except for section 3.4 (which was optional) will be covered on the exam. The exam will consist of: "Roughly one homework problem from each section, maybe with the numbers changed. Some will be easy ones and some hard ones." There is a sample final on the course website, but it was made using a different method, so it is not as good of a guide as the homework ploblems.

The final deadline for turning in any late matlab or good problems is at the final exam.

Here are some practice problems from sections 4.1–4.5, which were not covered by the other tests.

1. Sketch the graph of a single function that has all of the following properties:
   (a) Continuous and differentiable everywhere except at $x = -3$, where it has a vertical asymptote.
   (b) A horizontal asymptote at $y = 1$.
   (c) An x-intercept at $x = -2$.
   (d) A y-intercept at $y = 4$.
   (e) $f'(x) > 0$ on the intervals $(-\infty, -3)$ and $(-3, 2)$.
   (f) $f'(x) < 0$ on the interval $(2, \infty)$.
   (g) $f''(x) > 0$ on the intervals $(-\infty, -3)$ and $(4, \infty)$.
   (h) $f''(x) < 0$ on the interval $(-3, 4)$.
   (i) $f'(2) = 0$.
   (j) An inflection point at $(4, 3)$.
2. Analyze and graph the function $f(x) = x + \dfrac{9}{x}$.
3. A company wishes to manufacture a box with a volume of 6 m^3 that is open on top and has a square base. The material for the bottom of the box costs \$3 per m^2, while the material for the sides costs \$2 per m^2. Find the dimensions of the box that will lead to minimum total cost. What is the minimum total cost?
4. Let f be a continuous function with $f(0) = 3$, $f(2) = 6$, $f'(x) = 0$ for $0 < x < 1$, and $f'(x) < 2$ for $1 < x < 2$. Sketch such a function or explain why it is impossible.