

Math 201 GH — **EXAM #2** — May 5, 2014

Please PRINT your name on the cover of your exam booklet. Write clearly and cross-out work not to be graded. ALL ANSWERS GO IN THE EXAM BOOK.

NO calculators or other electronic devices, or scrap paper allowed. SHOW ALL WORK.

Total: 100 pts. plus extra credit.

1. Find the dimensions of a rectangle with perimeter 100 m whose area is as large as possible. (Even if you know the shape of the answer, you must show the analysis that leads to it.) (20 pts.)

2. Set-up, but **do NOT** evaluate numerically (i.e. you may leave your answer as a sum of unevaluated numerical terms), an approximation to the integral  $\int_0^2 x^2 dx$  using a Riemann sum with  $n = 4$  equal length subintervals and right endpoints as the sample points. (20 pts.)

**Extra credit:** evaluate your answer numerically and compare it to the exact answer (+5 pts.) by evaluating the definite integral.

3. Evaluate the following integrals: (30 pts.)

(a)

$$\int_1^2 (4x^3 + 2x) dx$$

(b)

$$\int_0^{\pi/4} \sec^2 t dt$$

(c)

$$\int (\sqrt{x^3} + \sqrt[3]{x^2}) dx$$

4. Sketch the graph of (30 pts.)

$$f(x) = \frac{x^2}{x^2 - 4}$$

given that

$$f'(x) = \frac{-8x}{(x^2 - 4)^2}$$

and

$$f''(x) = \frac{8(3x^2 + 4)}{(x^2 - 4)^3}.$$

Be sure to find and clearly label intercepts, horizontal and vertical asymptotes, local maxima and local minima, and inflection points, if any.