

40 pts. **Problem 1.** Use **Lagrange Multipliers** to find the maximum and minimum of the function  $f(x, y) = xy$  on the ellipse

$$\frac{x^2}{8} + \frac{y^2}{2} = 1.$$

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60 pts. **Problem 2.** Let  $R$  be the region in the  $xy$ -plane bounded by the curves  $y = 2x$  and  $y = x^2$ .

A. Set up an iterated integral for evaluating

$$\iint_R y \, dA$$

in the order  $dy \, dx$  (integrate first with respect to  $y$ , second with respect to  $x$ ).

B. Set up an iterated integral for evaluating

$$\iint_R y \, dA$$

in the order  $dx \, dy$ .

C. Evaluate one of the integrals above by hand computation.

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40 pts. **Problem 3.** Let  $R$  be the region in the first quadrant bounded by the circle  $x^2 + y^2 = 9$  and the coordinate axes. **Use polar coordinates** to evaluate the integral

$$\iint_R x \, dx \, dy.$$

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60 pts.

**Problem 4.** Let  $D$  be the solid region in three dimensional space that lies in the first octant and is bounded by the paraboloid  $z = 1 - x^2 - y^2$  and the coordinate planes.

A. Set up the limits for an iterated integral to evaluate

$$\iiint_D x \, dV$$

by integrating first with respect to  $x$ .

B. Set up an iterated integral to evaluate

$$\iiint_D x \, dV$$

by integrating first with respect to  $z$ . Change the  $xy$ -integral to polar coordinates.

C. Evaluate one of these integrals by hand computation.

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# EXAM

Exam 2

Math 2350-04, Spring 2008

April 9, 2008

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- Write all of your answers on separate sheets of paper. You can keep the exam questions when you leave. You may leave when finished.
- You **must** show enough work to justify your answers. Unless otherwise instructed, give exact answers, not approximations (e.g.,  $\sqrt{2}$ , not 1.414).
- This exam has 4 problems. There are **200 points total**.

Good luck!