40 pts.

Problem 1. **Use Lagrange Multipliers** to find the maximum and minimum of the function $f(x, y) = xy$ on the circle $x^2 + y^2 = 2$.

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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

$$\iint_R x \, dA$$

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

B. Set up an iterated integral for evaluating

$$\iint_R x \, dA$$

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 bounded above by the upper semicircle of the circle $x^2 + y^2 = 4$ and below by the x-axis. **Use polar coordinates** to evaluate the integral

$$\iint_R y \, dx \, dy.$$

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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 $z = x^2 + y^2$, the plane $z = 1$, the xz-plane, and the yz-plane.

A. Setup the limits for an iterated integral to evaluate

$$\iiint_D y \, dV$$

by integrating first with respect to y.

B. Setup an iterated integral to evaluate

$$\iiint_D y \, dV$$

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

C. Evaluate one of these integrals by hand computation.

EXAM

Exam 2

Math 2350-02, Spring 2008

April 9, 2008

- 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!