

40 pts. **Problem 1.** Locate and classify the critical points of the function

$$f(x, y) = \frac{x^2}{2} - 2xy + \frac{y^3}{3}$$

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

40 pts. **Problem 3.** Let R be the region in the xy -plane bounded by the curve $y = x^2$ and the line $y = x$. Find \bar{y} , the y -coordinate of the centroid of R . Evaluate the integrals by hand.

40 pts. **Problem 4.** Consider the integral

$$\int_{-2}^2 \int_{x^2}^4 f(x, y) dy dx.$$

Sketch the region of integration and find an equivalent iterated integral with the order of integration reversed.

40 pts. **Problem 5.** Let D be the region bounded below by the x -axis and above by the upper semi-circle of the circle $x^2 + y^2 = a^2$. Find \bar{y} , the y -coordinate of the centroid of D .

40 pts. **Problem 6.** Let D be the solid region in the first octant bounded by the coordinate planes and the plane $2x + 2y + z = 2$.

A. Set up an iterated integral for the volume of D with the order of integration $dz dy dx$. Evaluate this integral.

B. Set up an iterated integral for the volume of D with the order of integration $dy dx dz$. Do not evaluate this integral.

EXAM

Exam 2

Math 2350, Fall 2007

Nov 28, 2007

- 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 6 problems. There are **240 points total**.

Good luck!