EXAM 2

Math 103, Spring 2008-2009, Clark Bray.

You have 50 minutes.

No notes, no books, no calculators.

YOU MUST SHOW ALL WORK AND EXPLAIN ALL REASONING TO RECEIVE CREDIT. CLARITY WILL BE CONSIDERED IN GRADING.

Good luck!

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8.	Total Score	(/100 points)

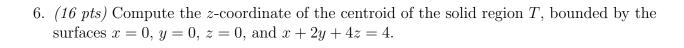
1. (16 pts) The solid D is bounded by the surface with equation $z^2 - \ln(2 - x^2 - y^2) = 0$. Find the absolute maximum value of the function $f(x, y, z) = x^2 + y^2 + z^2$ over the solid D.

2. (12 pts) Classify the critical point (1,1) of the function $f(x,y) = (y-x^2)(2x-y-1)$.

3. (12 pts) Find the unit vector representing the direction of fastest increase of the function $h(x, y, z) = e^{xyz}$ at the point (1, 2, 3).

4. (12 pts) Use the total derivative to approximate the value of the function $P(x,y) = e^{xy} - x(y+1)^2$ at the point (3.98, 0.01).

5. (12 pts) Suppose that z = f(x, y) where f has continuous second partials, x = u - 3v, and y = 3u + v. Find the mixed second partial z_{uv} in terms of partials of f.



7. (10 pts) Set up, but do not evaluate, an iterated integral representing the mass of the solid part of the first octant bounded by the coordinate planes, and the surfaces y = 1, 2x + y = 2, and x + z = 1, where the density function is given by $\delta(x, y, z) = \ln(1 + x^2 + 3y^2 + 2z^2)$.

8. (10 pts) Set up, but do not evaluate, an iterated integral representing the moment of inertia around the z-axis of the region in the yz-plane bounded by the curves $y = z^2$ and $y = 18 - z^2$, where density is given by $\delta(x, y, z) = y^2$.