Math 173 - Test 3a

April 28, 2011

Name _____

Score _____

Show all work. Supply explanations when necessary.

1. (8 points) Find and classify all critical points of the following function.

$$f(x, y) = 2x^2 + 2xy + y^2 + 2x - 3$$

2. (10 points) Let R be the polar region inside the graph of the $r = 2 + 2\cos\theta$ and outside the graph of $r = 1$. Sketch the region R and then evaluate $\iint_R (2r + 3)\, dA$. You may use your calculator to evaluate the iterated integral.

3. (7 points) Sketch the region of integration and then write the definite integral with the reversed order of integration. Two integrals will be required. Do not evaluate.

$$\int_{-\sqrt{2}}^{\sqrt{2}} \int_{x^2}^{4-x^2} (e^{4x} + 2y - 8)\, dy\, dx$$

4. (6 points) Evaluate the iterated integral by hand. Show all work, but you may use your calculator to check.

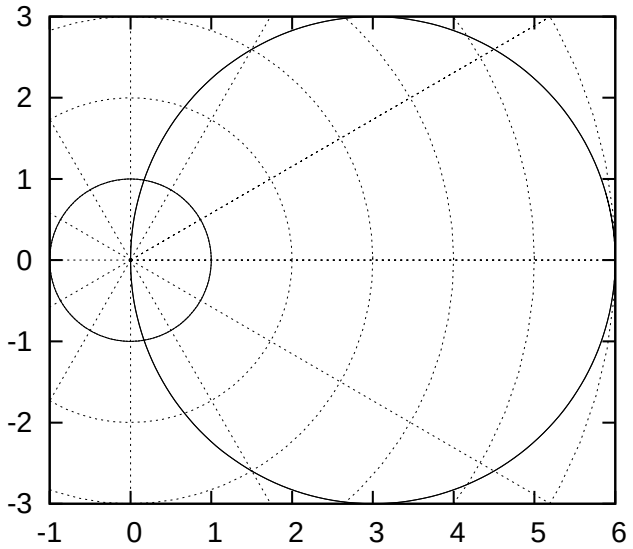
$$\int_0^1 \int_0^{\sqrt{1-y^2}} (x+y)\,dx\,dy$$

5. (5 points) One critical point of the function

$$f(x,y) = y^3 - 3x^2y - 3y^2 - 3x^2 + 1$$

is $(0,2)$. Use the 2nd partials test to classify this critical point.

6. (7 points) Let R be the polar region inside the graph of $r = 6\cos\theta$ and outside the graph of $r = 1$. Set up, but do not evaluate, the iterated integral in the $d\theta\, dr$ order that gives the area of R.



7. (7 points) Use Lagrange multipliers to find the minimum value of

$$f(x, y, z) = 2x^2 + y^2 + 3z^2$$

subject to the constraint $2x - 3y - 4z = 49$.

Math 173 - Test 3b

Name _____

April 28, 2011

Score _____

Show all work. Supply explanations when necessary.
YOU MUST WORK INDIVIDUALLY ON THIS EXAM.

1. (13 points) Find and classify all critical points of the following function.

$$f(x, y) = y^3 - 3x^2y - 3y^2 - 3x^2 + 1$$

2. (10 points) Section 13.9, Page 967, Problem #19.

3. (17 points) A tetrahedron in the 1st octant is bounded by the coordinate planes and the plane $x + 2y + z = 2$. The density of the tetrahedron at the point (x, y, z) is given by $\rho(x, y, z) = 2 + 2x + y + z^2$. Sketch the tetrahedron. Then set up all integrals required to determine the center of mass. Use your calculator (or computer algebra system) to evaluate the integrals and find the center of mass.

4. (10 points) Section 14.7, Page 1043, Problem #20. (Integrate by hand.)