Math 173 - Test 3a

April 25, 2013

Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (6 points) Evaluate the iterated integral by hand. Show all work, but you may use your calculator to check your work.

$$\int_0^1 \int_0^x \int_0^{xy} x \, dz \, dy \, dx$$

2. (4 points) Do you expect this statement to be true? Explain.

$$\int_0^1 \int_0^x f(x,y) \, dy \, dx = \int_0^1 \int_0^y f(x,y) \, dx \, dy$$

3. (10 points) Consider the following iterated integral.

$$\int_{-2}^{1} \int_{x+2}^{4-x^2} (x+y)\, dy\, dx$$

(a) Sketch the region of integration.

(b) Rewrite the integral with the order of integration reversed.

4. (10 points) Use the method of Lagrange multipliers to find the extreme values of $f(x, y) = x^2 y$ subject to $x + 2y = 2$.

5. (10 points) A thin triangular plate is bounded by the graphs of $y = 0$, $y = x$, and $x = 1$. Find the mass of the plate if its density at (x, y) is given by $\rho(x, y) = \sqrt{1 - x^2}$. Evaluate the integral by hand, showing all work.

6. (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 $\iint\limits_R (2r+3)\,dA$. You may use your calculator to evaluate the iterated integral.

Math 173 - Test 3b

April 25, 2013

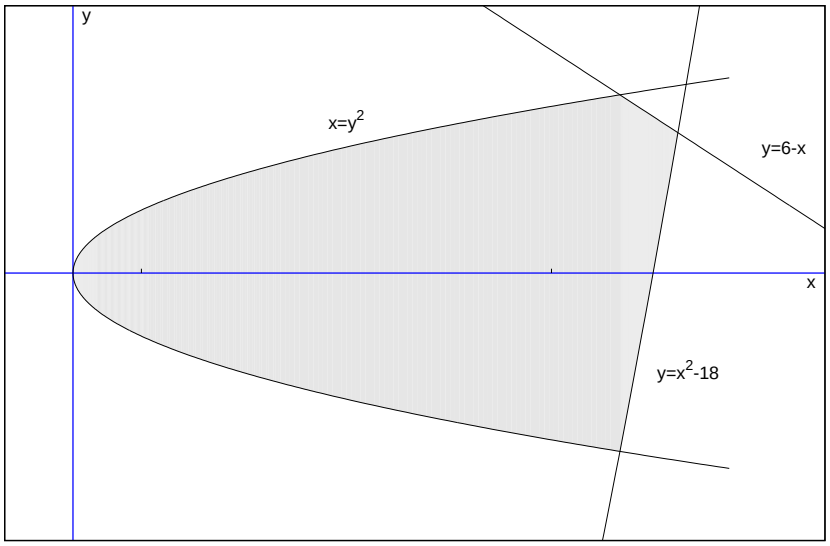
Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary. This portion of the test is due Monday, April 29. You must work individually on this test.

1. (9 points) Use the method of Lagrange multipliers to find the extreme values of $f(x, y) = xy$ subject to $\frac{x^2}{8} + \frac{y^2}{2} = 1$.

2. (9 points) The plane region R (shaded below) is bounded by the graphs of $x = y^2$, $y = 6 - x$, and $y = x^2 - 18$.



(a) Evaluate $\iint\limits_R dA$. After setting up your iterated integral(s), you may use your calculator for the evaluation.

(b) Set-up the expression that gives the average value of $y = x \sin x$ over R.

3. (9 points) Use a double (or triple) integral to find the volume of the space region in the first octant under the plane $x + y + z = 2$. You may use your calculator for the integral evaluation.

4. (9 points) R is the first quadrant region between the graphs of $y = \sqrt{x}$ and $y = x$. Set-up the double integral, in both rectangular and polar coordinates, that gives the area of R.

5. (9 points) A thin plate lies inside the circle $x^2 + y^2 = 4$ and to the right of $x = 1$. Find the center of mass of the plate if its density at the point (x, y) is given by $\rho(x, y) = x^2 + y^2 + 1$. You may use your calculator to evaluate any required integrals.

6. (5 points) Page 1036, Problem #38