Math 2313, Test III

Name _____

1. Evaluate $\int_0^4 \int_0^{\sqrt{y}} (x^2 + y^2)dxdy$

   answer: 40.838

2. Consider the integral $\int_0^1 \int_0^y f(x,y)dxdy$

   a. Reverse the order of integration.

   answer: $\int_0^1 \int_x^1 f(x,y)dydx$

   b. Write the integral in polar coordinates.

   answer: $\int_{\pi/4}^{\pi/2} \int_0^{csc(\theta)} f(x,y)rdrd\theta$

3. Find the volume of the cone $z = 1 - \sqrt{x^2 + y^2}$ above the xy plane, using a double integral. (Hint: much easier in polar coordinates)

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answer: $\pi/3$

4. Find the surface area of the cone of problem 3, above the xy plane (ie, don't include the base of the cone), using a double integral.

answer: $\sqrt{2}\pi$

5. a. Find the mass of the cube $0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1$, if the density is $\rho(x, y, z) = 1 + x^2$.

answer: $4/3$

   b. Find the center of mass of this cube. (Hint: two of the three coordinates can be found by symmetry, without doing any integrals.)

answer: $(9/16, 0.5, 0.5)$