

Math 2313, Test III

Name _____

1. Evaluate $\int_0^9 \int_{\sqrt{x}}^3 (2x + 2y) dy dx$

answer: 89.1

2. a. The rectangular solid $0 \leq x \leq 3, 0 \leq y \leq 2, 0 \leq z \leq 1$ has a density of $\rho(x, y, z) = 4x^3$. What is the mass of the cube?

answer: $M = 162$

- b. Find the center of mass $(\bar{x}, \bar{y}, \bar{z})$ of this solid. (Hint: the values of two of the three coordinates of the center are obvious and need not be calculated.)

answer: (2.4, 1.0, 0.5)

3. Reverse the order of integration for problem 1 and evaluate the new integral.

answer: 89.1

4. If $f(x, y) = x^3 + 15xy + y^3$ find all critical points and classify each as a maximum, minimum or saddle point.

answer: $(-5, -5)$ is a maximum, $(0, 0)$ is a saddle point

5. Find the surface area of the cone $z = 1 - \frac{1}{3}\sqrt{x^2 + y^2}$ above the xy plane (don't include the base) using a double integral. (Hint: use polar coordinates)

answer: $\sqrt{90}\pi$