

Midterm Exam #4

Math 275

December 5, 2001

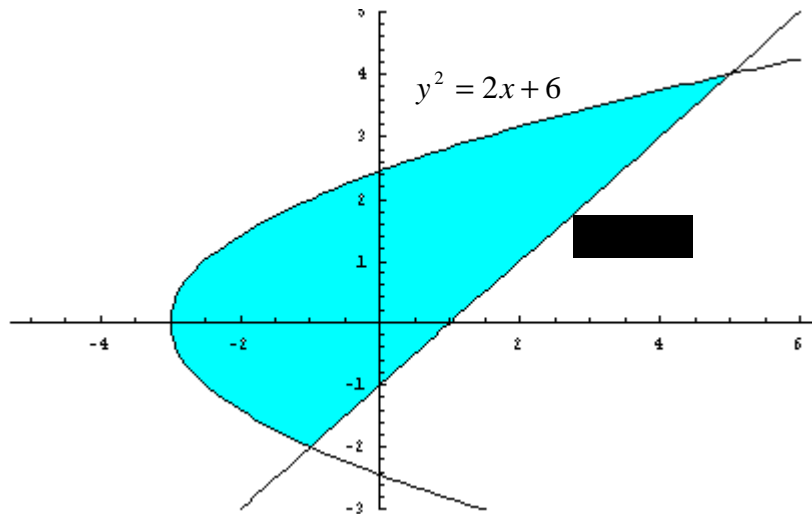
Name _____

Do all of your work on the blank paper provided. At the end of the exam, hand in your answers with this cover sheet. Include your name on all pages of your exam.

§1 Calculation

1. Evaluate $\iint_R (3x - y^2) dA$ exactly where $R = \{(x, y) : 0 \leq x \leq 2, 1 \leq y \leq 2\}$.

2. Evaluate $\iint_R xy dA$ exactly where R is the indicated shaded region.



3. Find the exact area enclosed by one loop of the four-leaved rose $r = \sin 2\theta$.
4. Find the volume of the solid bounded by the cylinder $x^2 + z^2 = 4$ and the planes $y = 0$ and $y = z + 2$.
5. Use spherical coordinates to find the volume of the solid that lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = z$.

§2 Comprehension

6. What is an iterated integral? What is a double integral? What is the relationship between them?

§3 Application

7. The density of a semicircular lamina of radius a is proportional to the distance from the center of the circle. Find the exact center of mass.
8. Find the area of the part of the paraboloid $z = x^2 + y^2$ that lies under the plane $z = 9$.

9. Find the mass of the solid of constant density bounded by the parabolic cylinder $x = y^2$ and the planes $x = z$, $z = 0$, and $x = 1$.
10. Find the center of mass of the solid in problem 9.