Calculus III, Mathematics 2210-90

Examination 3, Nov 13, 15, 2003

You may use graphing calculators and a Table of Integrals. Each problem is worth 20 points. You MUST show your work. Just the correct answer is not sufficient for any points.

1. Find
\[ \int \int_{R} (1 - x^2 - y^2) \, dx \, dy \]
where \( R \) is the region in the plane bounded by the curves \( y = 0 \), \( y = x^2 \), \( x = 1 \) .

2. Find the volume of the solid under the surface \( z = 9 - x^2 - y^2 \) and over the disk \( x^2 + y^2 \leq 9 \), and between the planes \( y = 0 \) and \( y = x \).

3. Find the area of the piece of the surface \( z = x^2 - y^2 \) lying over the disk \( x^2 + y^2 \leq 4 \).

4. Find the area of the parallelogram bounded by the lines
\[ 2x + y = 1, \quad 2x + y = 3, \quad y = x, \quad y = x + 4 \ . \]

5. The region in 3 dimensions bounded by the planes
\[ x = 0, \quad y = 0, \quad z = 0, \quad x = 1, \quad y = 1, \quad z = x + y \]
is filled with an inhomogeneous mud whose density is \( \delta(x, y, z) = 2 - z \). Find the mass of mud in this region.