

The Double Integral over more General Regions- HW Problems

Sketch the region over which the integral is being taken and then evaluate the integral.

1.
$$\int_0^1 \int_0^x (x + y) dy dx$$

2.
$$\int_0^2 \int_0^{4-x^2} (x^2 + 1) dy dx$$

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

4.
$$\int_0^2 \int_0^{1+y^2} (2x - 2y) dx dy$$

Evaluate the following integrals.

5.
$$\iint_D \sin(y) dA, \text{ Where } D \text{ is the region bounded by } y = 3x, y = x, x = \frac{\pi}{6}, x = \frac{\pi}{4} \text{ (Always start by drawing the region } D)$$

6.
$$\iint_D (xy) dA, \text{ Where } D \text{ is the region bounded by } y = x^2 - 10 \text{ and } y = -x^2 + 8.$$

7. Find the volume bounded by $z = 25 - x^2 - y^2$ and the four planes $z = 0$, $y = 0$, $y = x$, and $x + y = 2$.

8. Find the area of a circle of radius 3 using a double integral.

9. Find the area of the triangle with vertices at $(-2, 0)$, $(2, 0)$, and $(0, 4)$ using a double integral.

10. Find the volume of the solid bounded above by $z = 2x + 3y^2$ and over the region D in the x - y plane bounded by $x = 4 - y^2$ and the y axis.

11. Evaluate: $\iint_D 2xy dA$ where D is the region in the first quadrant of the x - y plane bounded by $x^2 + y^2 = 4$, $y = x$, and $x = 0$.