

## Assignment 2: Triple Integrals

Be sure to show all work, not just the final answer. The assignment is due at the beginning of class, August 6th.

1. Evaluate the following triple integrals:

(a)

$$\int_B (x + 2y + 4z) dV \text{ where } B = [1, 2] \times [-1, 0] \times [0, 3]$$

(b)

$$\int_{-1}^2 \int_1^{x^2} \int_0^{x+y} (2x^2y) dz dy dx$$

(c)

$$\int_E (xy) dV$$

where  $E$  is the tetrahedron with vertices  $(0, 0, 0)$ ,  $(1, 0, 0)$ ,  $(0, 1, 0)$ ,  $(0, 0, 2)$ .

2. Find the volume of the solid bounded by the curves

$$z = x^2, z = x^3, y = z^2, y = 0.$$

3. Suppose that a solid is bounded by the curves  $z + x^2 = 4$ ,  $y + z = 4$ ,  $y = 0$ , and  $z = 0$ , and has constant density 5. Find the total mass of the solid.

4. Evaluate the triple integral

$$\int_E \sqrt{x^2 + y^2 + z^2} dV$$

where  $E$  is the hemisphere  $x^2 + y^2 + z^2 \leq 1$ ,  $z \geq 0$ .

5. Find the Jacobian  $\partial(x, y, z)/\partial(u, v, w)$  for the transformation

$$x = 2u + 3v - w, y = v - 5w, z = u + 4w$$

6. Evaluate the integral

$$\int_D (x - y)^2 \cos^2(x + y) dx dy,$$

where  $D$  is the diamond with vertices  $(0, 1)$ ,  $(1, 2)$ ,  $(2, 1)$ ,  $(1, 0)$  by making the change of variable  $u = x - y$ ,  $v = x + y$ .