

Homework Section 15.3

1. Evaluate the following iterated integrals.

a)
$$\int_1^2 \int_y^2 8xy \, dx \, dy$$

b)
$$\int_0^{\pi/3} \int_0^{\sin \theta} \cos \theta \, dr \, d\theta$$

2. Evaluate the following double integrals.

a)
$$\iint_R \frac{y}{x^3+1} \, dA, \quad R = \{(x, y) \mid 1 \leq x \leq 4, 0 \leq y \leq 2x\}$$

b)
$$\iint_R e^{y/x} \, dA, \quad R = \{(x, y) \mid 0 \leq y \leq x^3, 1 \leq x \leq 2\}$$

c)
$$\iint_R x\sqrt{y^2-x^2} \, dA, \quad R = \{(x, y) \mid 0 \leq x \leq y, 0 \leq y \leq 1\}$$

d)
$$\iint_R x \sin y \, dA, \quad R \text{ is bounded by } y = 0, y = x^2, x = 1$$

3. Find the volume of the solid regions described below.

a) Below the plane $z = 2x + y$ and above the region bounded by $y = x$ and $y = x^2$.

b) Below the surface $z = 2xy$ and above the triangle with vertices $(1, 1)$, $(3, 1)$, and $(3, 5)$.

c) Bounded by the cylinder $x^2 + z^2 = 9$ and the planes $3y = x$, $x = 0$, $z = 0$ in the first octant.

4. Evaluate the integrals by reversing the order of integration:

a)
$$\int_0^2 \int_x^2 e^{y^2} \, dy \, dx$$

b)
$$\int_0^2 \int_{y^2}^4 y \cos(x^2) \, dx \, dy$$