

Difficulty guide for worksheet:

C-level or B-level exam problem: 1, 2, 3, 4

A-level exam problem or challenge for extra study: 5, 6

beyond the scope and/or removed from syllabus: none

1. Calculate each integral.

$$(a) \int_0^{\ln(4)} \int_0^{\ln(3)} \int_0^{\ln(2)} e^{-x+y+z} dz dy dx$$

$$(b) \int_1^6 \int_0^{4-2y/3} \int_0^{12-2y-3z} \frac{1}{y} dx dz dy$$

2. Sketch the region of integration for $\int_0^1 \int_0^{\sqrt{1-z^2}} \int_0^{\sqrt{1-y^2-z^2}} f(x, y, z) dx dy dz$.

3. Let \mathcal{T} be the tetrahedron with vertices $(0, 0, 0)$, $P = (6, 0, 0)$, $Q = (0, 4, 0)$, and $R = (0, 0, 2)$.

(a) Find an equation of the plane containing the points P , Q , and R .

(b) Evaluate the integral $\iiint_{\mathcal{T}} y dV$.

4. Let \mathcal{W} be the solid wedge above the xy -plane formed when the cylinder $x^2 + y^2 = 4$ is cut by the planes $z = 0$ and $y + z = 0$. Use a triple integral to find the volume of \mathcal{W} .

5. Let \mathcal{W} be the solid wedge bounded by the parabolic cylinder $y = x^2$ and the planes $z = 3 - y$ and $z = 0$. Calculate $\iiint_{\mathcal{W}} 35z dV$.

6. Let \mathcal{W} be the solid in the first octant bounded by the planes $y = 0$, $z = 0$, and $y = x$, and the elliptic cylinder $4x^2 + z^2 = 4$. Write the triple integral of the continuous function $f(x, y, z)$ in each of the six possible orders of integration.