

6. Let R be the volume given by $x^2 + y^2 + z^2 \leq 2z$, $x \geq 0$ and $z \geq 1$. Set up the integral

$$\int \int \int_R f dV$$

in rectangular, cylindrical and spherical coordinates. (You don't have to compute the integrals.)

7. Compute the integral of z^n on the unit sphere $x^2 + y^2 + z^2 = 1$. (n is a positive integer.)

8. Evaluate the double integral

$$\int \int_R \sqrt{25x^2 + 4y^2} dA$$

where R is the region enclosed by the ellipse $x^2/4 + y^2/25 = 1$. (Hint: Try to use substitutions.)

9. Find the flux of $\mathbf{F}(x, y, z) = (x^3 + \sin y, y^3 + e^z, z^3 - 1)$ across the hemisphere given by $x^2 + y^2 + z^2 = 4$ and $z \geq 0$. (For \mathbf{n} choose the direction pointing away from the origin.)