

In each of the problems, be sure to include clearly drawn sketches of R for double integrals and W for triple integrals. You might need to change the coordinate system in order to evaluate an integral. Show all work and use proper notation.

1. Change the order of integration: $\int_0^{7/2} \int_{y/2}^{14-y^2} f(x, y) dx dy$

2. Evaluate: $\int_0^{1/\sqrt{2}} \int_x^{\sqrt{1-x^2}} \cos(x^2 + y^2) dy dx$

3. Evaluate: $\int_R \frac{1}{(x^2 + y^2)^2} dA$ where R is the region outside the unit circle in the xy -plane.

4. Evaluate: $\int_0^5 \int_0^{\sqrt{25-x^2}} \int_{\sqrt{x^2+y^2}}^5 \frac{1}{\sqrt{x^2 + y^2 + z^2}} dz dy dx$

5. Evaluate $\int_W y^2 dV$ where W is the solid bounded by $x = 13 - y^2 - z^2$ and $x = 2$.

6. Evaluate: $\int_0^{\pi/2} \int_0^{\pi/4} \int_0^{5 \sec \phi} \rho^2 \sin \phi d\rho d\phi d\theta$

7. A cone stands with its flat base on the xy plane and its vertex on the positive z axis. The radius of the base is 2 and the height is 8. Find the total mass of the cone if the density at any point of the cone is proportional to its distance from the xy -plane.