

Problem 1

Evaluate $\int_0^1 \int_0^1 \int_{x^2}^1 12xz e^{zy^2} dy dz dx$. Hint: Change the order of integration.

Problem 2

Evaluate $\int_0^2 \int_0^{4-x^2} \int_0^x \frac{\sin(2z)}{4-z} dy dz dx$. Hint: Change the order of integration.

Problem 3

Consider the unit sphere centered at the origin with uniform density ($\delta(x, y, z) = 1$). Find the mass of this sphere (it should agree with the usual formula for volume, $\frac{4}{3}\pi r^3$). Verify that the center of mass is indeed the origin by finding M_{yz} , M_{xz} , M_{xy} and using the formula given in class. It may help to recall that the unit sphere is given by the equation $x^2 + y^2 + z^2 = 1$.