

1. A solid with density $\rho(x, y, z) = z$ occupies the region above the plane $z = 0$, below the plane $z = y$, and inside the cylinder $x^2 + y^2 = 4$.

a) Express the mass m of the solid as an integral in Cartesian coordinates.

b) Express the moment M_{xz} of the solid as an integral in Cylindrical coordinates.

c) Find $\bar{y} = \frac{M_{xz}}{m}$ (the y -coordinate of the center of mass of the solid).

2. Evaluate the integral by first reversing the order of integration: $\int_0^1 \int_x^1 \cos(y^2) dy dx$.

3. Rewrite the integral as an iterated integral in the order $dx dy dz$: $\int_{-1}^1 \int_{x^2}^1 \int_0^{1-y} f(x, y, z) dz dy dx$.