

Math 53 Discussion Problems Oct 31

1. Evaluate the following integrals by changing the order of integration in an appropriate way.

(a)
$$\int_0^4 \int_0^1 \int_{2y}^2 \frac{4 \cos(x^2)}{2\sqrt{z}} dx dy dz$$

(b)
$$\int_0^2 \int_0^{4-x^2} \int_0^x \frac{\sin 2z}{4-z} dy dz dx$$

2. Find the mass of a thin plate occupying the smaller region cut from the ellipse $x^2 + 4y^2 = 12$ by the parabola $x = 4y^2$ if the density at the point (x, y) is $\rho(x, y) = 5x$.
3. Find the center of mass of a thin plate bounded by the curves $x = y^2$ and $x = 2y - y^2$ if the density at the point (x, y) is $\rho(x, y) = y + 1$.
4. Find the center of mass of a solid of constant density bounded below by the paraboloid $z = x^2 + y^2$ and above by the plane $z = 4$.
5. Find the moments of inertia with respect to the three axes of a solid of constant density bounded below by the surface $z = 4y^2$, above by the plane $z = 4$ and on the ends by the planes $x = 1$ and $x = -1$.