

Math 203 — Triple integrals

Problem 1. Let D be the solid rectangular region given by $0 \leq x \leq 2, 0 \leq y \leq 1, 0 \leq z \leq 3$. Suppose the region has density $f(x, y, z) = 1 + xyz$. Find the mass of the region.

Problem 2. Let D be the solid region that is bounded by the planes $x = 0, y = 0, z = 0$, and $x + y + z = 1$. This shape is like a pyramid whose faces are all triangles. Make a 3d sketch of D and then make a 2d sketch of the region in the xy -plane of its bottom face. Set up a triple integral to find its mass given that it has density $f(x, y, z)$.

Problem 3. Let D be the solid region that is given by a solid cylinder bounded on the sides by $x^2 + y^2 = 1$ whose bottom face is the plane $z = -2$ and whose top face is the plane $x + y + z = 2$. Make a 3d sketch of D and then make a 2d sketch of its cross section with the xy -plane. Set up a triple integral to find its mass given that it has density $f(x, y, z)$.

Problem 4. Let D be the solid region that is bounded below by the paraboloid $z = x^2 + y^2$ and above by the paraboloid $z = 8 - (x^2 + y^2)$. Make a 3d sketch of D . Find where the two paraboloids intersect and make a sketch in the xy -plane of the 2d region enclosed by their intersection. Set up a triple integral to find its mass given that it has density $f(x, y, z)$.