Things to know Backwards and Forwards

a smattering of topics from chapter 16

○ Writing double integrals

  e.g., For D, the triangle with vertices $(0,0)$, $(2,1)$ and $(2,-1)$:

  1. Write double integrals for the area of D in rectangular and polar coordinates.

  2. Rewrite the rectangular integral with the variables of integration in the opposite order.

  3. If the density of the triangle is $\delta = x + |y|$ (g/cm^2), find the mass and center of mass of the triangle.

  4. If a three-dimensional solid is bounded below by D and above by $z = \sqrt{x^2 + y^2}$, write a double integral for its volume.

○ Writing triple integrals

  e.g., For E, the 3D solid bounded by $z = x^2$, $y = x^2$, $y = 1$ and $z = 0$:

  5. Set up a triple integral for the volume of E.

  6. Rewrite it with the five other orders of integration.

  7. If the density of the solid is $\delta = y$, write integrals for the mass and center of mass of the solid.

  8. Find the mass and center of mass.

○ Similar, in cylindrical and spherical coordinates:

  9. For G bounded by $z = 9 - x^2 - y^2$ and $z = 1$, repeat (5)–(8) (use $\delta = z$ instead of $\delta = y$, however).

  10. For H given as the eighth of a sphere in the 2nd octant (that is, $x < 0$, $y > 0$, $z > 0$) with radius 2, similarly repeat (5)–(8) (but use $\delta = \sqrt{x^2 + y^2 + z^2}$).