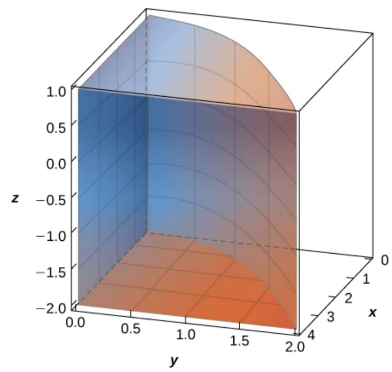
17 10-28-2025

17.1 Section 5.4, Exercise 212

Evaluate the triple integral over the bounded region $E = \{(x, y, z) : (x, y) \in D, u_1(x, y) \le z \le u_2(x, y)\}$, where D is the projection of E onto the xy-plane.

E is the solid bounded by $y = \sqrt{x}$, $x = 4$, $y = 0$, $z = -2$, and $z = 1$ (see figure below).



Evaluate $\iiint_E xyz\ dV$ (use $dx\ dy\ dz$).

17.2 Section 5.5, Checkpoints 5.28

Consider the region E inside the right circular cylinder with equation $r = 2\sin\theta$, bounded below by the $r\theta$-plane and bounded above by $z = 4 - y$. Set up a triple integral with a function $f(r, \theta, z)$ in cylindrical coordinates.

17.3 Section 5.5, Checkpoints 5.31

Set up a triple integral for the volume of the solid region bounded above by the sphere $\rho = 2$ and bounded below by the cone $\phi = \frac{\pi}{3}$.

17.4 Section 5.5, Example 5.50

the book does not draw a picture, but you should Convert the following rectangle into cylindrical coordinates:

$$\int_{y=-1}^{1} \int_{x=0}^{\sqrt{1-y^2}} \int_{z=x^2+y^2}^{\sqrt{x^2+y^2}} xyz \; dz \; dx \; dy$$

17.5 Section 5.5, Checkpoint 5.32

cyl. and sph. only Use cylindrical and spherical coordinates to set up triple integrals for finding the volume of the region inside the sphere $x^2 + y^2 + z^2 = 4$ but outside the cylinder $x^2 + y^2 = 1$.