

Section 15.7: Additional Problems

1. Convert these Cartesian points to cylindrical.

(a) $(1, 1, -1)$

(b) $(-1, -1, 3)$

2. The solid E is the region bounded by the paraboloids $z = x^2 + y^2$ and $z = 24 - x^2 - y^2$.

Set up the integral using the cylindrical coordinate system to evaluate $\iiint_E x^2 z \, dV$

3. The solid E is the region bounded by the paraboloids $y = x^2 + z^2$ and $y = 24 - x^2 - z^2$.

Set up the integral to evaluate $\iiint_E z^2 y \, dV$

4. Set up the integral, in cylindrical, to find the volume of the solid that is above the lower half of the sphere of radius 2, centered at the origin and below $z = 8 - 2(x^2 + y^2)$ and in the half-space $y \geq 0$.

5. Convert the integral $\int_0^3 \int_0^{\sqrt{9-x^2}} \int_{\sqrt{3x^2+3y^2}}^{\sqrt{36-x^2-y^2}} z \sqrt{x^2 + y^2 + z^2} \, dz dy dx$ to cylindrical