

15.2, number 69: Find the volume of the solid in the first octant bounded by the coordinate planes, the plane $x = 3$, and the parabolic cylinder $z = 4 - y^2$.

Answer: We put a picture of this solid on the next page. The solid has base in the xy -plane. The top is $z = 4 - y^2$. The volume is equal to the integral over the base of the top. The base is the rectangle $0 \leq x \leq 3$ and $0 \leq y \leq 2$.

The volume is equal to

$$\begin{aligned} & \int_0^3 \int_0^2 (4 - y^2) dy dx \\ &= \int_0^3 (4y - \frac{y^3}{3}) \Big|_0^2 dx \\ &= \int_0^3 8 - \frac{8}{3} dx \\ &= 3(\frac{16}{3}) \\ &= \boxed{16} \end{aligned}$$

Picture 15.2 Number 69

