

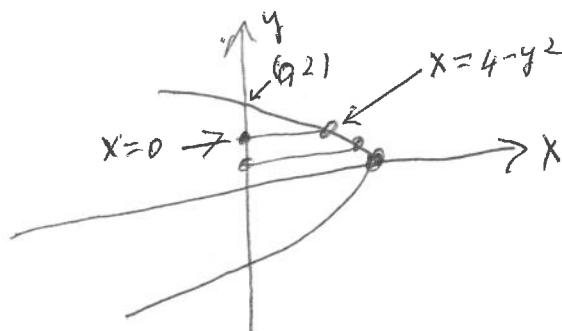
15.5, number 25: Find the volume of the region in the first octant bounded by the coordinate planes, the plane $y + z = 2$, and the cylinder $x = 4 - y^2$.

Answer: We drew a picture of the base on the next page. This picture shows us that the volume is equal to

$$\begin{aligned} & \int_0^2 \int_0^{4-y^2} (2-y) dx dy \\ &= \int_0^2 (2-y)x \Big|_0^{4-y^2} dy \\ &= \int_0^2 (2-y)(4-y^2) dy \\ &= \int_0^2 (8-4y-2y^2+y^3) dy \\ &= \left(8y - 2y^2 - \frac{2}{3}y^3 + \frac{1}{4}y^4 \right) \Big|_0^2 \\ &= 16 - 8 - \frac{16}{3} + 4 = \boxed{\frac{20}{3}} \end{aligned}$$

15.5 Number 25

The top is $z = 2 - y$. The base is



For each fixed y between $y=0$ and $y=2$; x goes from $x=0$ to $x=4-y^2$

So the volume is $\int_0^2 \int_0^{4-y^2} (2-y) dx dy$