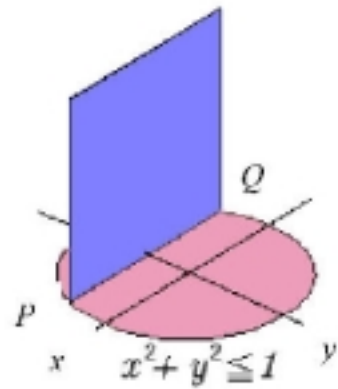


There is a solid whose bottom face is the circle $x^2 + y^2 \leq 1$ and every cross-section of the solid perpendicular to x-axis is a square. Find the volume of the solid.



Let P, Q be the 2 feet of the square.

$$P = (\sqrt{1-y^2}, y), Q = (-\sqrt{1-y^2}, y)$$

$$PQ = 2\sqrt{1-y^2}$$

Area of a slice of square = $4(1-y^2)$

$$dV = 4(1-y^2) dy$$

$$\text{Volume } V = \int_{-1}^1 4(1-y^2) dy$$

$$= 8 \int_0^1 (1-y^2) dy$$

$$= 8 \left[y - \frac{y^3}{3} \right]_0^1$$

$$= 8 \times \frac{2}{3} = \frac{16}{3}$$

