

Math 152 Quiz #4 Answers

1. Slicing perpendicular to the y -axis \Rightarrow Integrating with respect to y from $y = 0$ to $y = 2$

Cross-Sections are washers of with inner radius $r = 2$ and outer radius $R = 6 - y^2$.

$$\text{Area of the cross-section at } y: A(y) = \pi(R^2 - r^2) = \pi(32 - 12y^2 + y^4)$$

$$\begin{aligned} \text{Volume of solid} &= \int_0^2 \pi(32 - 12y^2 + y^4) dy = \pi[32y - 4y^3 + \frac{1}{5}y^5]_0^2 \\ &= \pi[64 - 32 + \frac{32}{5}] \\ &= \boxed{\frac{192\pi}{5} \text{ units}^3} \end{aligned}$$

2. The sidelength s of a square cross-section at x is $s = \frac{3}{x}$.

So, the area of the cross-section at x is given by $A(x) = s^2 = \frac{9}{x^2}$

$$\text{Volume of the solid} = \int_1^3 \frac{9}{x^2} dx = -\frac{9}{x} \Big|_1^3 = -\frac{9}{3} - (-9) = \boxed{6 \text{ units}^3}$$