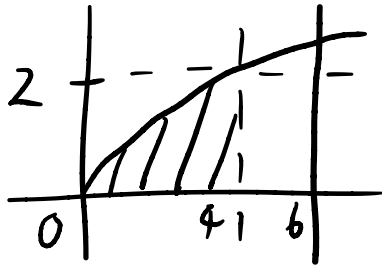# Volume of Revolution Via Washers

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$$\Delta V = \pi x^2 \, \Delta y$$

$$dV = \pi x^2 \, dy$$

$$y = \sqrt{x} \implies x = y^2$$

$$\implies dV = \pi y^4 \, dy$$

$$V = \int_0^2 \pi (6-x)^2 - \pi (2)^2 \, dy$$

$$= \pi \int_0^2 (6-y^2)^2 - 4 \, dy$$

$$= \pi \int_0^2 y^4 - 12y^2 + 32 \, dy$$

$$= \pi \left(\frac{y^5}{5} - \frac{12y^3}{3} + 32y \right) \Big|_0^2$$

$$= \pi \left(\frac{32}{5} - 4 \cdot 8 + 32 \cdot 2 \right)$$

$$\approx \pi \left(\frac{2^5 - 5 \cdot 2^5 + 10 \cdot 2^5}{5} \right)$$

$$= \frac{192}{5} \pi$$

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