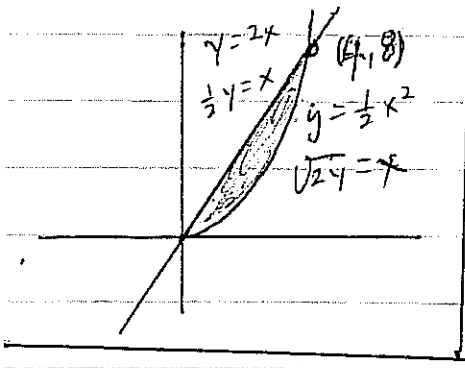


Example: Let R be the region between $y = \frac{1}{2}x^2$ and $y = 2x$



Spin R around y axis

By shells $V = 2\pi \int_0^4 x(2x - \frac{1}{2}x^2)$

$$= 2\pi \int_0^4 2x^2 - \frac{1}{2}x^3 dx = 2\pi \left[\frac{2}{3}x^3 - \frac{1}{8}x^4 \right]_0^4$$

$$= 2\pi \left[\frac{128}{3} - 32 \right] = \frac{64\pi}{3}$$

By washers

$$V = \pi \int_0^8 (\sqrt{2y})^2 - \left(\frac{1}{2}y\right)^2 dy = \pi \int_0^8 2y - \frac{1}{4}y^2 dy$$

$$= \pi \left[y^2 - \frac{1}{12}y^3 \right]_0^8 = \pi \left[64 - \frac{128}{3} \right] = \frac{64\pi}{3}$$