

Solutions: §6.3. 4,12,18,20,22

4.

$$\begin{aligned} V &= \int_0^1 2\pi x(x^2)dx \\ &= 2\pi \int_0^1 x^3 dx \\ &= 2\pi \frac{1}{4} x^4 \Big|_0^1 \\ &= \frac{\pi}{2} \end{aligned}$$

12.

$$\begin{aligned} V &= \int_0^4 2\pi y(4y^2 - y^3)dy \\ &= 2\pi \int_0^4 4y^3 - \frac{1}{4}y^4 dy \\ &= 2\pi \left(y^4 - \frac{1}{20}y^5 \right) \Big|_0^4 \\ &= \frac{512\pi}{5} \end{aligned}$$

18.

$$\begin{aligned} V &= \int_0^4 2\pi(x+2)[(8x-2x^2) - (4x-x^2)]dx \\ &= \int_0^4 2\pi(x+2)(4x-x^2)dx \\ &= \int_0^4 2\pi(8x+2x^2-x^3)dx \\ &= 2\pi \left(4x^2 + \frac{2}{3}x^3 - \frac{1}{4}x^4 \right) \Big|_0^4 \\ &= \frac{256\pi}{3} \end{aligned}$$

20.

$$\begin{aligned} V &= \int_0^1 2\pi(y+1)(\sqrt{y}-y^2)dy \\ V &= \int_0^1 2\pi(y^{3/2} - y^3 + y^{1/2} - y^2)dy \\ V &= 2\pi \left(\frac{2}{5}y^{5/2} - \frac{1}{4}y^4 + \frac{2}{3}y^{3/2} - \frac{1}{3}y^3 \right) \Big|_0^1 \end{aligned}$$

$$= \frac{58\pi}{60}$$

22.

$$V = \int_0^3 2\pi(7-x)[(4x-x^2)-x]dx$$

$$V = \int_0^3 2\pi(21x-10x^2+x^3)dx$$

$$V = 2\pi\left(\frac{21}{2}x^2 - \frac{10}{3}x^3 + \frac{1}{4}x^4\right)\Big|_0^3$$

$$1999\frac{1}{2}\pi$$