

HW §6.2 Numbers 2,6,12,16,48,54,60

2.

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

6.

$$\begin{aligned} A &= \int_0^{\pi/2} (e^x - \sin x) dx \\ &= e^x + \cos x \Big|_0^{\pi/2} \\ &= e^{\pi/2} - 2 \end{aligned}$$

14.

$$\begin{aligned} V &= \int_0^1 \pi(y - y^2)^2 dy \\ &= \pi \left(\frac{1}{3} y^3 - \frac{1}{2} y^4 + \frac{1}{5} y^5 \right) \Big|_0^1 \\ &= \frac{\pi}{30} \end{aligned}$$

12.

$$\begin{aligned} V &= \int_0^2 \pi(4 - \sqrt{x})^2 dx \\ &= \pi \left(4x - \frac{16}{3} x^{3/2} + \frac{1}{2} x^2 \right) \Big|_0^2 \\ &= 10 - \frac{16}{3} \sqrt{8} \end{aligned}$$

16.

$$\begin{aligned} V &= \int_0^1 (\pi(2 - y^2)^2 - \pi(2 - y)^2) dy \\ &= \pi \left(\frac{-4}{3} y^3 + \frac{1}{5} y^5 + 2y^4 - \frac{1}{3} y^3 \right) \Big|_0^1 \\ &= \frac{\pi 8}{15} \end{aligned}$$

48.

$$V = \int_{\frac{hr}{R-r}}^{\frac{hR}{R-r}} \left[\pi \left(\frac{R-r}{h} x \right)^2 \right] dy$$

$$\frac{\pi(R-r)^2}{h^2} \frac{x^2}{2} \Big|_{\frac{hr}{R-r}}^{\frac{hR}{R-r}}$$

$$= \frac{h\pi}{3(R-r)}(R^3 - r^3)$$

54.

$$V = \int_{-r}^r (2\sqrt{r^2 - y^2})^2 dy$$

$$= 4(r^2y - \frac{1}{3}y^3) \Big|_{-r}^r$$

$$= \frac{8}{3}r^3$$

60.

a.

$$V = \int_{-r}^r h\sqrt{r^2 - y^2} dy$$

b. $\frac{h\pi r^2}{2}$