The washer and shell method that kicked my butt.

Find the volume of the solid of revolution when $-x^2 + 5 \cdot x$, from $x = 1$ to $x = 4$ is revolved around the line $x = 1$

$$2 \cdot \mathrm{Pi} \cdot \int_1^4 (x-1) \cdot \left(-x^2 + 5 \cdot x\right) \, dx$$

$$\frac{99\,\pi}{2} \qquad \mathbf{(1.1)}$$

$$\mathrm{Pi} \cdot 3^2 \cdot 4 + \mathrm{Pi} \cdot \int_4^{\frac{25}{4}} \left(\left(\frac{5}{2} + \mathrm{sqrt}\left(\frac{25}{4} - y\right) - 1 \right)^2 - \left(\frac{5}{2} - \mathrm{sqrt}\left(\frac{25}{4} - y\right) - 1 \right)^2 \right) dy$$

$$\frac{99\,\pi}{2} \qquad \mathbf{(1.2)}$$

$$f := x \to -x^2 + 5 \cdot x$$

$$f := x \mapsto -x^2 + 5\,x \qquad \mathbf{(1.3)}$$

$$f\left(\frac{5}{2}\right)$$

$$\frac{25}{4} \qquad \mathbf{(1.4)}$$

$$f(1)$$

$$4 \qquad \mathbf{(1.5)}$$

$$f(4)$$

$$4 \qquad \mathbf{(1.6)}$$

$$solve(y = f(x), x)$$

$$\frac{5}{2} + \frac{\sqrt{25 - 4\,y}}{2}, \frac{5}{2} - \frac{\sqrt{25 - 4\,y}}{2} \qquad \mathbf{(1.7)}$$

Washer and shell method from Test 5, Fall '17

We find the volume of the solid of revolution obtained by revolving the region bounded by $y = 4\sqrt{2\,x}$ and $y = 2x^2$.

$$4 \cdot \mathrm{sqrt}(2 \cdot x)$$

$$4\sqrt{2}\,\sqrt{x} \qquad \mathbf{(2.1)}$$

$$2 \cdot \mathrm{Pi} \cdot \int_0^2 x \cdot \left(4\,\mathrm{sqrt}(2 \cdot x) - 2 \cdot x^2\right) \, dx$$

$$\frac{48\,\pi}{5} \qquad \mathbf{(2.2)}$$

$$\mathrm{Pi}\cdot\int_0^8 \left(\frac{y}{2} - \left(\frac{y^2}{32}\right)^2\right) \mathrm{d}y$$

$$\frac{48\,\pi}{5} \quad \textbf{(2.3)}$$