Zadatak 32.   Izračunaj volumen rotacijskog tijela što se dobije rotacijom sinusoide oko osi apscisa unutar intervala $[0, \pi]$.

Rješenje.

$$V = \pi \int_0^\pi \sin^2 x\, dx = \pi \int_0^\pi \frac{1 - \cos 2x}{2} dx = \pi \left(\int_0^\pi \frac{1}{2} dx - \frac{1}{2} \int_0^\pi \cos 2x\, dx \right) =$$

$$\pi \left(\frac{\pi}{2} - \frac{1}{2} \int_0^{2\pi} \frac{\cos t}{2} dt \right) = \pi \left(\frac{\pi}{2} - \frac{1}{4} \sin t \Big|_0^{2\pi} \right) = \pi \left(\frac{\pi}{2} - \frac{1}{4} (\sin 2\pi - \sin 0) \right) = \frac{\pi^2}{2}.$$