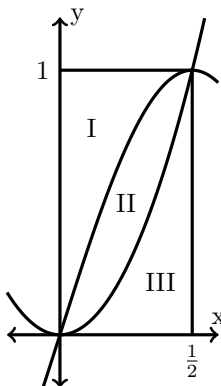


### We All Want To Change The World

Consider the regions I, II, and III bounded by the curves  $y = \sin(\pi x)$ ,  $y = 4x^2$ , and the lines  $x = 0$ ,  $x = \frac{1}{2}$ ,  $y = 0$ , and  $y = 1$ .



Each of the following integrals gives a volume of rotation. Identify the axis of rotation and the region(s) rotated.

1.  $\int_0^{1/2} \pi (1 - 16x^4) dx$

2.  $\int_0^{1/2} 2\pi x (\sin(\pi x) - 4x^2) dx$

3.  $\int_0^{1/2} 2\pi (x + 3) \sin(\pi x) dx$

4.  $\int_0^{1/2} \pi \left( (2 - \sin(\pi x))^2 - 1 \right) dx$

5.  $\int_0^{1/2} \pi \left( (4x^2 + 2)^2 - 2^2 \right) dx$

6.  $\int_0^{1/2} 2\pi (1 - x) (1 - \sin(\pi x)) dx$

7.  $\int_0^1 2\pi (1 - y)^{\frac{1}{2}} \sqrt{y} dy$

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