

October 29

How do you find the volume when the
area of each cross-section is given by
the equation $y = \ln(x)$?

$$\int_a^b \ln x \, dx$$

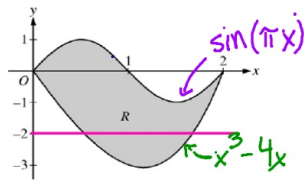


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Students will verbally explain how to
find the volume by slicing
(using the words:
cross-section, area, dimensions, slice...)



Question 1



Let R be the region bounded by the graphs of $y = \sin(\pi x)$ and $y = x^3 - 4x$, as shown in the figure above.

- (a) Find the area of R .

$\hookrightarrow \int \text{upper} - \text{lower}$

- (b) The horizontal line $y = -2$ splits the region R into two parts. Write, but do not evaluate, an integral expression for the area of the part of R that is below this horizontal line.

$\int -2 - \text{lower}$ $\hookrightarrow y = -2 = \text{top}$

- (c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x -axis is a square. Find the volume of this solid.

$A = b^2$ $\int \text{Area } dx$ of shape $\text{vertical} \rightarrow dx$

- (d) The region R models the surface of a small pond. At all points in R at a distance x from the y -axis, the depth of the water is given by $h(x) = 3 - x$. Find the volume of water in the pond.

$b = \text{top} - \text{bottom}$
 $h = 3 - x$
 $w = dx$

$\int \text{Area } dx \rightarrow b \cdot h \cdot w$

