

Volumes of Cross Sections

(Calculator Permitted) Let R be the region bounded by the graphs of $y = \sqrt{x}$, $y = e^{-x}$, and the y -axis.

(a) Find the area of R .

(b) Find the volume of the solid generated when R is revolved about the line $y = -1$.

(c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x -axis is a semicircle whose diameter runs from the graph of $y = \sqrt{x}$ to the graph of $y = e^{-x}$. Find the volume of this solid.

(Calculator Permitted) The base of the volume of a solid is the region bounded by the curve $y = 2 + \sin x$, the x -axis, $x = 0$, and $x = \frac{3\pi}{2}$. Find the volume of the solids whose cross sections perpendicular to the x -axis are the following:

(a) Squares

(b) Rectangles whose height is 3 times the base

(c) Equilateral triangles

(d) Isosceles right triangles with a leg on the base

(e) Isosceles triangles with hypotenuse on the base

(f) Semi-circles

(g) Quarter-circles