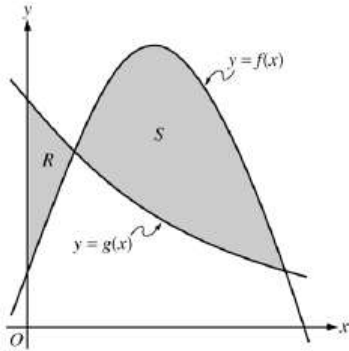


2005 BC1



1. Let f and g be the functions given by $f(x) = \frac{1}{4} + \sin(\pi x)$ and $g(x) = 4^{-x}$. Let R be the shaded region in the first quadrant enclosed by the y -axis and the graphs of f and g , and let S be the shaded region in the first quadrant enclosed by the graphs of f and g , as shown in the figure.

- Find the area of R .
- Find the area of S .
- Region S is the base of a solid. For this solid, each cross section perpendicular to the x -axis is a square. Find the volume of the solid.
- Find the volume of the solid generated when S is revolved about the horizontal line $y = -1$.
- Find the perimeter of the region S .