

5. [12 points] A right isosceles triangle is a right triangle whose sides containing the right angle are of equal length. The length from the triangle's hypotenuse to its right-angle vertex (opposite of the hypotenuse) is half the length of the hypotenuse.

Consider the solid whose cross sections perpendicular to the x -axis are right isosceles triangles, where the hypotenuse of each triangular cross-section is contained in the region of the xy -plane bounded by the curves $y = \sin(x)$ and $y = -\sin(x)$ between $x = 0$ and $x = \pi$.

- a. [3 points] Find the volume of the cross-sectional slice located at $x = x_i$ with thickness Δx .

- b. [3 points] Write a Riemann sum that approximates the volume of the entire solid using n cross-sectional slices.

- c. [6 points] Find the exact volume of the solid by using a definite integral.