Math 10B. Lecture Examples.

Section 8.1. Areas and volumes†

Example 1  The base of a solid is the region between the curves \( y = \frac{1}{2}x^2 \) and \( y = 1 - \frac{1}{2}x^2 \) for \( 0 \leq x \leq 1 \) in an \( xy \)-plane and its cross sections perpendicular to the \( x \)-axis are squares. Find its volume.

Answer: Figures A1a and A1b. \( \text{Volume} = \frac{8}{15} \)

Example 2  The intersection of a solid with an \( xy \)-plane with distances measured in meters is the region \( R \) between the curves \( y = x^{1/3} \) and \( y = \frac{4}{3}x^{1/3} \) for \( 0 \leq x \leq 1 \). The cross sections of the solid perpendicular to the \( x \)-axis are circles with diameters in the \( xy \)-plane. Find its volume.

Answer: Figures A2a and A2b. \( \text{Volume} = \frac{1}{60}\pi \) cubic meters

Interactive Examples

Work the following Interactive Examples on Shenk’s web page, http://www.math.ucsd.edu/~ashenk/‡:

Section 7.3: Examples 1 and 2

‡Lecture notes to accompany Section 8.1 of Calculus by Hughes-Hallett et al

‡The chapter and section numbers on Shenk’s web site refer to his calculus manuscript and not to the chapters and sections of the textbook for the course.