Volumes with Cross Sections

Numberbender | WORKSHEET

Name: _____ Date: _____ Score: _____

Find the volume of each solid using cross sections. Show all work.

Calculus 1 Worksheet #57
Introduction to Volumes with Cross Sections

Learn: Today you learn how to find volumes using CROSS SECTIONS.

Notes: Volume = $\int$ Area of Cross Sections

1. $\lim_{x\to\infty} \dfrac{20x^2-13x+5}{5-4x^3}$ =

2. $\lim_{h\to 0} \dfrac{\ln(2+h)-\ln 2}{h}$ =

3. If, y = e^{-x^2} , then y" (0) =

4. $\int 5^{2x}$

5. $\int_{\pi/4}^{\pi/2} \sin^3 x \cos x \, dx$ =

6. $\int_0^1 \dfrac{e^x}{(3-e^x)^2} dx$ = A) $3\ln(e-3)$ B) 1 C) $\dfrac{1}{3-e}$ D) $\dfrac{e-2}{3-e}$ E) None of these

7. The average value of $\frac{1}{2}t^2 - \frac{1}{3}t^3$ over the interval $-2 \le t \le 1$ is

8. At what value of h is the rate of increase of $\sqrt{h}$ twice the rate of increase of h?

9. A function f (x) equals $\dfrac{x^2-x}{x-1}$ for all x except x =1. In order that the function be continuous at x = 1, the value of f(1) must be?

10. $\int \left(\sqrt{x}-2\right)x^2 \, dx$ =

11. If y = $\dfrac{x-3}{2-5x}$, then $\dfrac{dy}{dx}$ =

12. The hypotenuse AB of a right triangle ABC is 5 ft, and one leg, AC, is decreasing at the rate of 2 ft/sec. The rate, in square feet per second, at which the area is changing when AC = 3 is

13*. Find the volume of the solid whose base is the region bounded between the curves y = x and y = x^2, and whose cross sections perpendicular to the x−axis are squares.

14*. The base of a certain solid is the region enclosed by y = $\sqrt{x}$, y = 0, and x = 4. Every cross section perpendicular to the x−axis is a semicircle with its diameter across the base. Find the volume of the solid.

1. Find the volume of the solid generated when the region enclosed between y = $\sqrt{x}$, x = 1, x = 4, and the x−axis is revolved about the y−axis.

Answers:

Volumes with Cross Sections

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Answer key — for instructor use only.

1) 0	2) $\frac{1}{2}$	3) –2	4) $\frac{5^{2x}}{2\ln 5}+C$	5) $\frac{3}{16}$	6) E
7) $\frac{11}{12}$	8) $\frac{1}{16}$	9) 1	10) $\frac{2}{7}x^{\frac{7}{2}}-\frac{2}{3}x^{3}+\mathrm{C}$	11) $\frac{-13}{(2-5x)^2}$	12) $-\frac{7}{2}$
13) $\frac{1}{30}$	14) π	15) $\frac{124\pi}{5}$			