

MATH 1300: HW #14

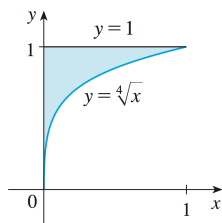
Due on April 27, 2017 at 10:00am

Professor Braden Balentine Section 005

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Section 5.3

50. The boundaries of the shaded region are the y -axis, the line $y = 1$, and the curve $y = \sqrt[3]{x}$. Find the area of this region by writing x as a function of y and integrating with respect to y (as in Exercise 49).



56. If $f(x)$ is the slope of a trail at a distance of x miles from the start of the trail, what does $\int_3^5 f(x)dx$ represent?

$\int_3^5 f(x)dx$ represents the change in slope between miles 3 and 5 of the trail.

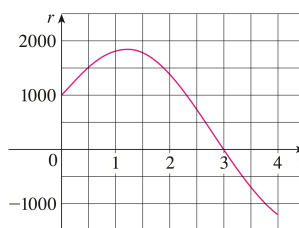
58. If the units for x are feet and the units for $a(x)$ are pounds per foot, what are the units for da/dx ? What units does $\int_2^8 f(x)ax$ have?

$\int_2^8 f(x)ax$ has units of (lb/ft)/ft.

63. The linear density of a rod of length 4 m is given by $p(x) = 9 + 2\sqrt{x}$ measured in kilograms per meter, where x is measured in meters from one end of the rod. Find the total mass of the rod.

$$\begin{aligned}
 \text{total mass} &= \int_0^4 (9 + 2\sqrt{x})dx \\
 &= \left[9x + \frac{4}{3}x^{\frac{3}{2}} \right]_0^4 \\
 &= 36 + \frac{32}{3} - (0 + 0) \\
 &= \frac{140}{3}
 \end{aligned}$$

68. Water flows into and out of a storage tank. A graph of the rate of change $r(t)$ of the volume of water in the tank, in liters per day, is shown. If the amount of water in the tank at time $t = 0$ is 25,000 L, use the Midpoint Rule to estimate the amount of water four days later.



$$\int_0^4 r(t) dt = v(4) - v(0)$$

$$3250L = v(4) - 25000$$

$$v(4) = 28250L$$

$$\Delta t = 1$$

$$\int_0^4 r(t) dt = r(0.5)\Delta t + r(1.5)\Delta t + r(2.5)\Delta t + r(3.5)\Delta t$$

$$= 1(1500 + 1750 + 750 - 750)$$

$$= 1 \text{ day}(3250 \text{ L/day})$$

$$= 3,250 \text{ L}$$

Additional Problem

Suppose h is a function such that $h(2) = -4$, $h'(2) = -7$, $h''(2) = 6$, $h(5) = 8$, $h'(5) = 10$, and $h''(5) = 20$, and h'' is continuous everywhere. Evaluate $\int_2^5 h''(u) du$.