

Calculus 1 Solved problems—Integrals—applications

1. Find the area under the graph of $f(x) = \frac{1}{\sqrt{1-x^2}}$ on the interval $[0, \frac{1}{2}]$.
2. Find the area of the finite region bounded by the curves $y = \sqrt{x}$, $y = 0$, and $y = x - 2$.
3. Consider the finite region R bounded by the curves $y = \sqrt{x^2 - 1}$, $y = 0$, $x = 2$.
 - a) Find the volume of the solid obtained by revolving the region R about the x -axis.
 - b) Find the volume of the solid obtained by revolving the region R about the y -axis.
 - c) Find the volume of the solid obtained by revolving the region R about the axis $x = -1$.
4. Find the length of the curve $f(x) = x^2$ for $x \in [-1, 1]$.
5. If it converges, evaluate the integral

$$\int_1^{\infty} \frac{dx}{x\sqrt{x-1}}.$$

6. Decide whether the following integral converges:

$$\int_2^{\infty} \frac{x-1}{x^2-x+1} dx.$$