

Essentials of Calculus

The definite integral

Homework 5.2

1. Write down an integral that indicates the area under the graph $y = \sqrt{x^2 + 1}$ from $x = -1$ to $x = 3$. (Do not attempt to evaluate the integral.)

Numeric answer: $\int_{-1}^3 \sqrt{x^2 + 1} dx$

2. Write down an integral that indicates the area under the graph of $f(x) = \sqrt{4 - x^2}$ from $x = 0$ to $x = 2$. (Do not attempt to evaluate the integral.)

Numeric answer: $\int_0^2 \sqrt{4 - x^2} dx$

3. An object travels so that in t minutes, it is traveling at $f(t) = 5/(t+1)$ feet/min. Write down an integral that indicates how far the car has traveled from $t = 1$ hour to $t = 5$ hours. (Do not attempt to evaluate the integral.)

Numeric answer: $\int_1^5 (5/(t+1)) dt$ feet.

4. A car is 20 miles away, and in 2 hours it is 100 miles away. If $f(t)$ is the car's velocity (in mi/hr) in t hours, evaluate $\int_0^2 f(t) dt$.

Numeric answer: $\int_0^2 f(t) dt = 80$ miles.

5. In 2 seconds, a runner is 100 yards away. In 7 seconds, the runner is 150 yards away. If $f(t)$ is the runner's velocity (in yards/sec) in t seconds, evaluate $\int_2^7 f(t) dt$.

Numeric answer: $\int_2^7 f(t) dt = 50$ yards.