4.4 Using Geometry for Definite Integrals

GRAPH THE INTEGRANDS AND USE GEOMETRY TO EVALUATE THE DEFINITE INTEGRALS.

911. $\displaystyle\int_{-2}^{4} \left(\frac{x}{2}+3\right)\,dx$

912. $\displaystyle\int_{-3}^{3} \sqrt{9-x^2}\,dx$

913. $\displaystyle\int_{-2}^{1} |x|\,dx$

914. $\displaystyle\int_{-1}^{1} (2-|x|)\,dx$

915. $\displaystyle\int_{0}^{b} x\,dx$ where $b>0$

916. $\displaystyle\int_{a}^{b} 2x\,dx$ where $0<a<b$

917. Suppose f and g are continuous and that

$$\int_1^2 f(x)\,dx=-4, \qquad \int_1^5 f(x)\,dx=6, \qquad \int_1^5 g(x)\,dx=8.$$

Evaluate the following definite integrals.

a) $\displaystyle\int_2^2 g(x)\,dx$

b) $\displaystyle\int_5^1 g(x)\,dx$

c) $\displaystyle\int_1^2 3f(x)\,dx$

d) $\displaystyle\int_2^5 f(x)\,dx$

e) $\displaystyle\int_1^5 [f(x)-g(x)]\,dx$

f) $\displaystyle\int_1^5 [4f(x)-g(x)]\,dx$

918. Suppose that $\displaystyle\int_{-3}^{0} g(t)\,dt=\sqrt{2}$. Find the following.

a) $\displaystyle\int_0^{-3} g(t)\,dt$

b) $\displaystyle\int_{-3}^{0} g(u)\,du$

c) $\displaystyle\int_{-3}^{0} -g(x)\,dx$

d) $\displaystyle\int_{-3}^{0} \frac{g(\theta)}{\sqrt{2}}\,d\theta$

919. A particle moves along the x-axis so that at any time $t\geq 0$ its acceleration is given by $a(t)=18-2t$. At time $t=1$ the velocity of the particle is 36 meters per second and its position is $x=21$.

a) Find the velocity function and the position function for $t\geq 0$.

b) What is the position of the particle when it is farthest to the right?

When you feel how depressingly
Slowly you climb,
It's well to remember
That things take time.

—Piet Hein