Sections 5.5 & 5.6 – The Definite Integral & The Fundamental Theorem of Calculus

Sketch the region whose signed area is represented by the definite integral, and evaluate the integral using an appropriate formula from geometry, where needed.

13. a. $\int_0^3 x\,dx$ b. $\int_{-2}^{-1} x\,dx$ c. $\int_{-1}^4 x\,dx$ d. $\int_{-5}^5 x\,dx$

15. a. $\int_0^5 2\,dx$ b. $\int_0^\pi \cos x\;dx$ c. $\int_{-1}^2 |2x-3|\,dx$ d. $\int_{-1}^1 \sqrt{1-x^2}\,dx$

25. Evaluate $\int_{-1}^3 (4-5x)\,dx$

Find the area under the curve y=f(x) over the stated interval.

9. $f(x)=e^{2x};\ [0,\ln 2]$ 10. $f(x)=\frac{1}{x};\ [1,5]$

Evaluate the integrals using the Fundamental Theorem of Calculus (Part 1).

13. $\int_{-2}^1 (x^2-6x+12)\,dx$ 15. $\int_1^4 \frac{4}{x^2}\,dx$

17. $\int_4^9 2x\sqrt{x}\,dx$ 19. $\int_{-\pi/2}^{\pi/2} \sin\theta\;d\theta$

23. $\int_{\ln 2}^3 5e^x\,dx$ 25. $\int_0^{1/\sqrt{2}} \frac{1}{\sqrt{1-x^2}}\,dx$

Use Theorem 5.5.5 to evaluate the given integrals.

31. a. $\int_{-1}^1 |2x-1|\,dx$ b. $\int_0^{3\pi/4} |\cos x\,|\,dx$

32. a. $\int_{-1}^2 \sqrt{2+|x|}\,dx$ b. $\int_0^{\pi/2} \left|\frac{1}{2}-\cos x\right|\,dx$

Evaluate each limit by interpreting it as a Riemann sum in which the given interval is divided into *n* subintervals of equal width.

71. $\lim_{n\to\infty}\sum_{k=1}^n \frac{\pi}{4n}\sec^2\left(\frac{\pi k}{4n}\right);\ \left[0,\frac{\pi}{4}\right]$ 72. $\lim_{n\to\infty}\sum_{k=1}^n \frac{n}{n^2+k^2};\ [0,1]$