H9

A

[Ex 4.8]

In Exercises find an antiderivative for each function. Do as many as you can mentally. Check your answers by differentiation.

1. a. $2x$ **b.** x^2 **c.** $x^2 - 2x + 1$

5. a. $\frac{1}{x^2}$ **b.** $\frac{5}{x^2}$ **c.** $2 - \frac{5}{x^2}$

9. a. $\frac{2}{3}x^{-1/3}$ **b.** $\frac{1}{3}x^{-2/3}$ **c.** $-\frac{1}{3}x^{-4/3}$

B

[Ex 5.3]

In Exercises graph the integrands and use areas to evaluate the integrals.

15. $\int_{-2}^{4} \left(\frac{x}{2} + 3\right) dx$ **16.** $\int_{1/2}^{3/2} (-2x + 4)\, dx$

17. $\int_{-3}^{3} \sqrt{9 - x^2}\, dx$ **18.** $\int_{-4}^{0} \sqrt{16 - x^2}\, dx$

C

[Ex 5.4]

Evaluate the integrals in Exercises.

3. $\int_{0}^{4} \left(3x - \frac{x^3}{4}\right) dx$ **8.** $\int_{-2}^{-1} \frac{2}{x^2}\, dx$

10. $\int_{0}^{\pi} (1 + \cos x)\, dx$ **26.** $\int_{0}^{\pi} \frac{1}{2}(\cos x + |\cos x|)\, dx$

D

[Ex 5.5]

Evaluate the indefinite integrals in Exercises by using the given substitutions to reduce the integrals to standard form.

1. $\int \sin 3x\, dx, \quad u = 3x$

6. $\int x^3(x^4 - 1)^2\, dx, \quad u = x^4 - 1$

12. $\int \frac{dx}{\sqrt{5x + 8}}$

a. Using $u = 5x + 8$ **b.** Using $u = \sqrt{5x + 8}$

E

[Ex 6.1]

49. The volume of a torus The disk $x^2 + y^2 \le a^2$ is revolved about the line $x = b$ $(b > a)$ to generate a solid shaped like a doughnut and called a *torus*. Find its volume. (*Hint:* $\int_{-a}^{a} \sqrt{a^2 - y^2}\, dy = \pi a^2/2$, since it is the area of a semicircle of radius a.)

F

[Ex 4.2]

56. Parallel tangents Assume that f and g are differentiable on $[a, b]$ and that $f(a) = g(a)$ and $f(b) = g(b)$. Show that there is at least one point between a and b where the tangents to the graphs of f and g are parallel or the same line. Illustrate with a sketch.