

5.5 Group Activity Problems



Table 5.6 General Integration Formulas

$$1. \int \cos ax \, dx = \frac{1}{a} \sin ax + C$$

$$2. \int \sin ax \, dx = -\frac{1}{a} \cos ax + C$$

$$3. \int \sec^2 ax \, dx = \frac{1}{a} \tan ax + C$$

$$4. \int \csc^2 ax \, dx = -\frac{1}{a} \cot ax + C$$

$$5. \int \sec ax \tan ax \, dx = \frac{1}{a} \sec ax + C$$

$$6. \int \csc ax \cot ax \, dx = -\frac{1}{a} \csc ax + C$$

$$7. \int e^{ax} \, dx = \frac{1}{a} e^{ax} + C$$

$$8. \int b^x \, dx = \frac{1}{\ln b} b^x + C, b > 0, b \neq 1$$

$$9. \int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + C$$

$$10. \int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a} + C, a > 0$$

$$11. \int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \left| \frac{x}{a} \right| + C, a > 0$$

17–44. Indefinite integrals Use a change of variables or Table 5.6 to evaluate the following indefinite integrals. Check your work by differentiating.

$$17. \int 2x(x^2 - 1)^{99} \, dx$$

$$18. \int xe^{x^2} \, dx$$

45–74. Definite integrals Use a change of variables or Table 5.6 to evaluate the following definite integrals.

64.
$$\int_0^{\ln 4} \frac{e^x}{3 + 2e^x} dx$$

70.
$$\int_{-1}^1 (x - 1)(x^2 - 2x)^7 dx$$

95. Explain why or why not Determine whether the following statements are true and give an explanation or counterexample.

c.
$$\int \sin 2x dx = 2 \int \sin x dx.$$

d.
$$\int (x^2 + 1)^9 dx = \frac{(x^2 + 1)^{10}}{10} + C.$$

96–98. Areas of regions Find the area of the following regions.

96. The region bounded by the graph of $f(x) = \frac{x}{\sqrt{x^2 - 9}}$ and the x -axis between $x = 4$ and $x = 5$