Take this quiz as you would take a quiz in class. When you are done, check your work against the answers given in the back of the book.

In Exercises 1–8, find the indefinite integral. Check your result by differentiation.

1. \( \int 3 \, dx \) \hspace{1cm} 2. \( \int 10x \, dx \) \hspace{1cm} 3. \( \int \frac{1}{x^3} \, dx \)

4. \( \int (x^3 - 2x + 15) \, dx \) \hspace{1cm} 5. \( \int (6x + 1)^3 \, dx \) \hspace{1cm} 6. \( \int x(5x^2 - 2)^4 \, dx \)

7. \( \int (x^2 - 5x)(2x - 5) \, dx \) \hspace{1cm} 8. \( \int \frac{3x^2}{(x^3 + 3)^3} \, dx \) \hspace{1cm} 9. \( \int \sqrt{5x + 2} \, dx \)

In Exercises 10 and 11, find the particular solution that satisfies the differential equation and initial condition.

10. \( f'(x) = 16x; \ f(0) = 1 \) \hspace{1cm} 11. \( f'(x) = 9x^3 + 4; \ f(1) = 5 \)

12. The marginal cost function for producing \( x \) units of a product is modeled by

\[ \frac{dC}{dx} = 16 - 0.06x. \]

It costs $25 to produce one unit. Find (a) the cost function \( C \) (in dollars), (b) the fixed cost (when \( x = 0 \)), and (c) the total cost of producing 500 units.

13. Find the equation of the function \( f \) whose graph passes through the point \( (0, 1) \) and whose derivative is

\[ f'(x) = 2x^2 + 1. \]

14. The number of bolts \( B \) produced by a foundry changes according to the model

\[ \frac{dB}{dt} = \frac{250t}{\sqrt{t^2 + 36}}, \quad 0 \leq t \leq 40 \]

where \( t \) is the time (in hours). Find the number of bolts produced in (a) 8 hours and (b) 40 hours.

In Exercises 15–17, use the Exponential Rule to find the indefinite integral.

15. \( \int 5e^{x^3 + 4} \, dx \) \hspace{1cm} 16. \( \int 3x^2 e^{x^3} \, dx \) \hspace{1cm} 17. \( \int (x - 3)e^{x^2 - 6x} \, dx \)

In Exercises 18–20, use the Log Rule to find the indefinite integral.

18. \( \int \frac{2}{2x - 1} \, dx \) \hspace{1cm} 19. \( \int \frac{1}{3 - 8x} \, dx \) \hspace{1cm} 20. \( \int \frac{x}{3x^2 + 4} \, dx \)

21. The rate of change in sales for Advance Auto Parts from 2001 through 2009 can be modeled by

\[ \frac{dS}{dt} = 26.32t + \frac{848.99}{t} \]

where \( S \) is the sales (in millions) and \( t \) is the time (in years), with \( t = 1 \) corresponding to 2001. In 2001, the sales for Advance Auto Parts were $2517.6 million. (Source: Advance Auto Parts, Inc.)

(a) Find a model for the sales of Advance Auto Parts.
(b) Find the sales for Advance Auto Parts in 2008.