Determine the indefinite integral below.

$$\int (12x+5)^2 dx = \int (144x^2 + 120x + 25)\, dx$$

$$= \frac{144x^3}{3} + \frac{120x^2}{2} + 25x + C$$

$$= 48x^3 + 60x^2 + 25x + C$$

$$\int (x^3 - 6\sqrt{x} + x^{-5/4})\, dx = \int (x^3 - 6x^{\frac{1}{2}} + x^{-5/4})\, dx$$

$$= \frac{x^4}{4} - \frac{6x^{3/2}}{\frac{3}{2}} + \frac{x^{-\frac{1}{4}}}{-\frac{1}{4}} + C$$

$$= \frac{x^4}{4} - 4x^{3/2} - \frac{4}{x^{1/4}} + C$$

$$\int \left(\frac{3}{x} - 8e^{3x} + \sqrt{x^7}\right) dx = 3\int \frac{1}{x}\, dx - 8\int e^{3x}\, dx + \int x^{7/2}\, dx$$

$$= 3\ln|x| - \frac{8e^{3x}}{3} + \frac{x^{9/2}}{9/2} + C$$

$$= 3\ln|x| - \frac{8}{3}e^{3x} + \frac{2}{9}x^{9/2} + C$$

Evaluate. Assume that x > 0.

$$\int\left(\frac{5}{x}+\frac{6}{x^3}\right)dx = 5\int\frac{dx}{x} + 6\int x^{-3}dx$$

$$= 5\ln x + 6\cdot\frac{x^{-2}}{-2} + C$$

$$= 5\ln x - \frac{3}{x^2} + C$$

OR $\boxed{\ln x^5 - \frac{3}{x^2} + C}$

Determine the indefinite integral.

$$\int 2e^{9x}\,dx = 2\int e^{9x}dx = 2\cdot\frac{e^{9x}}{9} + C$$

$$= \frac{2}{9}e^{9x} + C$$

$$\int\frac{u^7-5u^5+6}{u^5}du = \int\left(u^2 - 5 + 6u^{-5}\right)du$$

$$= \frac{u^3}{3} - 5u + \frac{6u^{-4}}{-4} + C$$

$$= \frac{u^3}{3} - 5u - \frac{3}{2u^4} + C$$

$$(a^3-b^3) = (a-b)(a^2+ab+b^2)$$

$$(x^3-5^3) = (x-5)(x^2+5x+25)$$

$$\int\frac{x^3-125}{x-5}dx = \int(x^2+5x+25)dx$$

$$= \frac{x^3}{3} + \frac{5x^2}{2} + 25x + C$$

Find f such that $f'(x) = \frac{9}{\sqrt{x}}$, $f(4) = 49$.

A company determined that the marginal cost, $C'(x)$ of producing the xth unit of a product is given by $C'(x) = x^4 - 2x$. Find the total cost function C, assuming that C(x) is in dollars and that fixed costs are $2000.

A ball is thrown upward from a height of 256 feet above the ground, with an initial velocity of 96 feet per second. From
physics it is known that the velocity at time t is $v(t) = 96 - 32t$ feet per second.

a) Find $s(t)$, the function giving the height of the ball at time t.
b) How long will the ball take to reach the ground?
c) How high will the ball go?