Example 1
Find the general indefinite integral.

(a) \( \int (5e^x - \sin(x) + \sec^2(x)) \, dx \)

(b) \( \int \frac{4}{x} \, dx \)

(c) \( \int \left( 5 - x^2 + \frac{3}{x^2 + 1} \right) \, dx \)
Example 2
Evaluate the following definite integrals.

(a) \[ \int_0^\pi \cos(x) \, dx \]

(b) \[ \int_{-1}^4 (x - 3x^2) \, dx \]

(c) \[ \int_0^5 |x - 2| \, dx \]
Example 3

Perform each integration using the appropriate substitution(s).

(a) \[ \int (4x + 5)^{20} \, dx \]

(b) \[ \int \sin(x) \cos(x) \, dx \]

(c) \[ \int \left( e^{3x} - \sin(5x) + \frac{3}{10x - 1} \right) \, dx \]
Example 4
Evaluate each integral using the appropriate substitution(s).

(a) \[ \int_{\frac{\pi}{2}}^{\pi} \sin(2x) \, dx \]

(b) \[ \int_{3}^{4} x \sqrt{x^2 - 5} \, dx \]

(c) \[ \int_{-3}^{5} (\sin^2(3x) + \cos^2(3x)) \, dx \]
Example 5

The velocity of a particle moving along the $x$-axis is given by the function $v(t) = 5 - t\ \text{m/sec}$.

(a) In which direction does the particle move during the first 5 seconds?

(b) What happens at $t = 5$ sec?

(c) In which direction does the particle move at $t = 8$ sec?

(d) Find the displacement of the particle from $0 \leq t \leq 8$ seconds.

(e) Find the distance traveled by the particle from $0 \leq t \leq 8$ seconds.