

4.9 examples

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4.9 examples

Calculus AB – section 4.9 – Antiderivatives

Example 1

Find two antiderivatives of $f(x) = \cos x$.

Then determine the general antiderivative.

$$F(x) = \sin x$$

$$F(x) = \sin x - 1$$

$$F(x) = \sin x + C$$

Example 2

Evaluate $\int 3x^4 - 5x^{2/3} + x^{-3} dx$

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

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$$-3x^{5/3}$$

Example 3

Evaluate $\int \frac{5}{x} - 3x^{-10} dx = 5 \ln|x| + \frac{x^{-9}}{3} + C$

Example 4

Evaluate $\int \sin(2t - 9) + 20 \cos 3t dt$

$$-\frac{1}{2} \cos(2t - 9) + \frac{20}{3} \sin 3t + C$$

$$292; 5, 6, 7, 9-12, 20, 43, 44$$

Example 5

Evaluate: a) $\int 3e^x - 4 \, dx$

b) $\int 12e^{7-3x} \, dx$

Example 6

Solve $\frac{dy}{dx} = 4x^7$ subject to the initial condition $y(0) = 4$

Example 7

Solve $\frac{dy}{dt} = \sin(\pi t)$, with initial condition $y(2) = 2$

Example 8

At time $t = 0$, a car traveling with velocity 96 ft/s begins to slow down with constant deceleration $a = -12 \text{ ft/s}^2$. Find the velocity $v(t)$ at time t and the distance traveled before the car comes to a halt.

Example 9

Solve $y' = 10e^{-2x}$ with initial condition $y(0) = 12$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C$$

Power Rule for integration

$$\int \frac{1}{x} dx = \ln|x| + C$$