MAT122

Antiderivatives

Antiderivatives - Intro

If f' is a derivative of f then f is an <u>antiderivative</u> of f'

Likewise, f' is an antiderivative of f''

Notation: or integral $\int f(x)dx$

A function F is called an antiderivative of f on some interval I if $F'(x) = f(x)$ for all x on I.

Common Antiderivatives

If F is an antiderivative of f on I then the **general** antiderivative of f on I is $F(x) + C$ where C is an arbitrary constant.

To find the general antiderivative of a function, determine what it is the derivative of and add **+ C**.

Antiderivative of Power Function

$$\text{if } f(x) = x^n$$

$$\text{then } F(x) = \frac{x^{n+1}}{n+1} + C$$

ex. $f(x) = x^2$ ex. $f(x) = 8x^9 - 3x^6 + 12x^3$ ex. $f(x) = \dfrac{10}{x^9}$

$$F(x) = \boxed{\frac{x^3}{3} + C}$$

$$F(x) = \boxed{\frac{4}{5}x^{10} - \frac{3}{7}x^7 + 3x^4 + C}$$

$$F(x) = \boxed{-\frac{5}{4x^8} + C}$$

Antiderivative of Power Function - Do

Do: Find the general antiderivatives of the following:

$$\text{if } f(x) = x^n$$

$$\text{then } F(x) = \frac{x^{n+1}}{n+1} + C$$

$$f(x) = 4x^3 \qquad\qquad f(x) = 5x^9 - 14x^6 + 12x^3 \qquad\qquad \text{ex. } f(x) = \frac{6}{x^2}$$

then $F(x) =$ then $F(x) =$

then $F(x) =$