WARM UP

Use the rules of differentiation to compute the derivatives of the following functions. Please simplify your answers.

(c) $p(x) = \sqrt{\frac{(x^2+x)}{x^2}}$

Apr 28-7:29 PM

Calculus 120
Unit 5: Odds and Ends

June 3, 2019: Day #3

1. Return Tests

2. Kiana Finish Test

3. Missing Work?

4. UNB Test?

Jan 9-1:43 PM

Antiderivatives

A function F is an antiderivative of f on an interval if $F'(x) = f(x)$

For example y = 3x is an antiderivative for y = 3.

Find all antiderivatives of the function $f(x) = 2x$.

$F(x) = x^2 + C$
constant

May 25-3:36 PM

If F is an antiderivative of *f* on an interval, then the most general antiderivative of *f* on that interval is *F*(*x*) + *C*, where *C* is a constant.

To determine antiderivatives, we just use our knowledge of derivatives, but backwards. Some common antiderivatives are below:

$f(x)$	an antiderivative
$x^n \ (n \neq -1)$	$\frac{x^{n+1}}{n+1}$
$x^{-1} = \frac{1}{x}$	$\ln\lvert x\rvert$
e^x	e^x
$\sin x$	$-\cos x$
$\cos x$	$\sin x$
$\sec^2 x$	$\tan x$
$\frac{1}{\sqrt{1-x^2}}$	$\sin^{-1} x$
$\frac{1}{1+x^2}$	$\tan^{-1} x$
e^{kx}	$\frac{e^{kx}}{k}$
$\cos kx$	$\frac{\sin kx}{k}$
$\sin kx$	$\frac{-\cos kx}{k}$

$y = x^{-1}$
$y = \frac{1}{x}$

$f(x) = x^3$
$F(x) = \frac{x^4}{4} + C$
$\frac{1}{4}x^4$

$f(x) = e^{5x}$
$F(x) = \frac{e^{5x}}{5}$

$f(x) = \cos 7x$
$F(x) = \frac{\sin 7x}{7}$

May 25-3:45 PM

Ex: Determine the antiderivative F(x) for each function given.

$f(x) = 2x^2 - x + 7$

$F(x) = \frac{2x^3}{3} - \frac{x^2}{2} + 7x + C$

$f(x) = \cos x - \sin x$

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

e^{kx}

$f(x) = -3e^{-x} + 6e^{2x}$

$F(x) = \frac{-3e^{-x}}{-1} + \frac{6e^{2x}}{2} + C$

$F(x) = 3e^{-x} + 3e^{2x} + C$

May 25-6:24 PM

Ex: Find the antiderivative of *f* on the interval $(0,\infty)$.

$f(x) = \frac{2}{x^2} - \frac{5}{x} + x$

$f(x) = 2x^{-2} - 5\left(\frac{1}{x}\right) + x$

$F(x) = \frac{2x^{-1}}{-1} - 5\ln\lvert x\rvert + \frac{x^2}{2} + C$

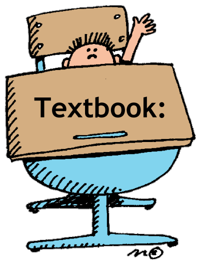
$F(x) = -\frac{2}{x} - 5\ln\lvert x\rvert + \frac{x^2}{2} + C$

$f(x) = \sin x + \frac{1}{x^3}$

$F(x) = -\cos x + \frac{x^{-2}}{-2}$

$F(x) = -\cos x - \frac{1}{2x^2} + C$

May 25-6:01 PM



Red Book: p. 408 #1, 2, 3, 4, 5, 6 ab

Jan 13-9:38 PM

$$f(x) = \frac{e^{2x}}{1-e^{x^2}}$$

$$f'(x) = \frac{(1-e^{x^2})(e^{2x})(2) - e^{2x}(-e^{x^2})(2x)}{(1-e^{x^2})^2}$$

Jun 3-10:37 AM

$y = e^x$ $\quad y' = e^x$

$y = a^x$ $\quad y' = a^x \ln a$

$y = \ln x$ $\quad y' = \frac{1}{x}$

$y = \log_a x$ $\quad y' = \frac{1}{x \ln a}$

Jun 3-10:44 AM

$y = \ln(\cos x) - \sin(\ln x)$

$y' = \frac{1}{\cos x}(-\sin x) - \cos(\ln x)\left(\frac{1}{x}\right)$

$y = \arctan x = \tan^{-1} x$

$y' = \frac{1}{1+x^2}$

Jun 3-10:45 AM

First Principles / Definition of a Derivative:

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$\frac{d}{dx} \sin x = \cos x$

$\frac{d}{dx} \cos x = -\sin x$

$\frac{d}{dx} \tan x = \sec^2 x$

$\frac{d}{dx} \csc x = -\csc x \cot x$

$\frac{d}{dx} \sec x = \sec x \tan x$

$\frac{d}{dx} \cot x = -\csc^2 x$

$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$

$\frac{d}{dx} \cos^{-1} x = -\frac{1}{\sqrt{1-x^2}}$

$\frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$

$\frac{d}{dx} e^x = e^x$

$\frac{d}{dx} a^x = a^x \ln a$

$\frac{d}{dx} \ln x = \frac{1}{x}$

$\frac{d}{dx} \log_a x = \frac{1}{x \ln a}$

Jun 3-10:48 AM

4. $6x^2 + (3xy) + 2y^2 + 17y = 6 \quad @(-1, 0)$

$12x + 3xy' + y(3) + 4yy' + 17y' = 0$

$3xy' + 4yy' + 17y' = -12x - 3y$

$y'(3x + 4y + 17) = -12x - 3y$

$(-1, 0)$ $\quad y' = \frac{-12x - 3y}{3x + 4y + 17}$

$= \frac{-12(-1) - 0}{3(-1) + 17}$

$= \frac{12}{14}$

$m = \frac{6}{7}$

$P(-1, 0)$

$y = mx + b$

$0 = \frac{6}{7}(-1) + b$

$\frac{6}{7} = b$

$y = \frac{6}{7} x 1$

Jun 3-10:53 AM

$y = (x+1)^{1-x}$ logarithmic

$\ln y = \ln (x+1)^{1-x}$

$\ln y = \boxed{(1-x)}\boxed{\ln(x+1)}$

$\frac{1}{y} y' = (1-x)\left(\frac{1}{x+1}\right) + \ln(x+1)(-1)$

$y' = y\left[\left(\frac{1-x}{x+1}\right) - \ln(x+1)\right]$

$y' = (x+1)^{1-x}\left(\left(\frac{1-x}{x+1}\right) - \ln(x+1)\right)$

Jun 3-10:59 AM

Attachments

2.1_74_AP.html

2.1_74_AP.swf

2.1_74_AP.html