

DERIVATIVES WE KNOW SO FAR

$f(x)$	$f'(x)$	Antiderivative $F(x)$
$f(x) = x^n$	$f'(x) = nx^{n-1}$	$F(x) = \frac{x^{n+1}}{n+1}$
$f(x) = e^x$	$f'(x) = e^x$	$F(x) = e^x$
$f(x) = b^x$	$f'(x) = \ln(b)b^x$	$F(x) = \frac{1}{\ln(b)}b^x$
$f(x) = \ln(x)$	$f'(x) = \frac{1}{x}$	$F(x) = ???$
$f(x) = \log_b(x)$	$f'(x) = \frac{1}{\ln(b)} \frac{1}{x}$	$F(x) = ???$
$f(x) = \sin(x)$	$f'(x) = \cos(x)$	$F(x) = -\cos(x)$
$f(x) = \cos(x)$	$f'(x) = -\sin(x)$	$F(x) = \sin(x)$
$f(x) = \tan(x)$	$f'(x) = \sec^2(x)$	$F(x) = ???$
$f(x) = \cot(x)$	$f'(x) = -\csc^2(x)$	$F(x) = ???$
$f(x) = \sec(x)$	$f'(x) = \sec(x)\tan(x)$	$F(x) = ???$
$f(x) = \csc(x)$	$f'(x) = -\csc(x)\cot(x)$	$F(x) = ???$

WE ALSO KNOW:

For any function $f(x)$ and constant a ,

Rule	Example
$[f(x + a)]' = f'(x + a)$	$\frac{d}{dx}(\ln(x + 12)) = \frac{1}{x + 12}$
$[f(x) + a]' = f'(x)$	$\frac{d}{dx}(\cos(x) + \pi) = -\sin(x)$
$[af(x)]' = af'(x)$	$\frac{d}{dx}(3\sin(x)) = 3\cos(x)$
$[f(ax)]' = af'(ax)$	$\frac{d}{dx}(e^{27x}) = 27e^{27x}$

Product Rule	$(uv)' = u'v + uv'$
Quotient Rule	$\left(\frac{u}{v}\right)' = \frac{vu' - uv'}{v^2}$
Chain Rule	$[f(u(x))]' = f'(u)u'(x)$