16.9: Derivatives and Primitives (Indefinite Integrals)

$f(x)$	$f'(x)$	$\int f(x)dx(\pm c)$
k	0	kx
x^n	$nx^{n-1}, n \neq 0$	$\frac{x^{n+1}}{n+1}, n \neq -1$
$\frac{1}{x}$	$-\frac{1}{x^2}$	$ln\|x\|$
a^x	$a^x \ln a$	$\frac{a^x}{\ln a}$
e^x	e^x	e^x
$\log_a x$	$\frac{1}{x \ln a}$	$\frac{x \ln x - x}{\ln a}$
$\ln x$	$\frac{1}{x}$	$x \ln x - x$
$\sin x$	$\cos x$	$-\cos x$
$\cos x$	$-\sin x$	$\sin x$
$\tan x$	$\frac{1}{\cos^2 x}$	$-\ln(\cos x)$
$\arcsin x$	$\frac{1}{\sqrt{1-x^2}}$	$x \arcsin x + \sqrt{1-x^2}$
$\arccos x$	$-\frac{1}{\sqrt{1-x^2}}$	$x \arccos x - \sqrt{1-x^2}$
$\arctan x$	$\frac{1}{1+x^2}$	$x \arctan x - \frac{1}{2}\ln(1+x^2)$
$\frac{1}{a^2+x^2}$	$\frac{-2x}{(a^2+x^2)^2}$	$\frac{1}{a}\arctan\left(\frac{x}{a}\right)$
$\frac{1}{\sqrt{a^2-x^2}}$	$\frac{x}{(a^2-x^2)^{\frac{3}{2}}}$	$\arcsin\left(\frac{x}{a}\right)$

- $\int \sin^2(ax)dx = \frac{x}{2} - \frac{\sin(2ax)}{4a} + c$
- $\int \cos^2(ax)dx = \frac{x}{2} + \frac{\sin(2ax)}{4a} + c$
- $\int \sin^3(ax)dx = \frac{1}{12a}\cos(3ax) - \frac{3}{4a}\cos(ax) + c$
- $\int \cos^3(ax)dx = \frac{1}{12a}\sin(3ax) + \frac{3}{4a}\sin(ax) + c$
- $\int x\cos(ax)dx = \frac{\cos(ax)}{a^2} + \frac{\sin(ax)}{a}x + c$
- $\int x\sin(ax)dx = \frac{\sin(ax)}{a^2} - \frac{\cos(ax)}{a}x + c$
- $\int x\sin^2(ax)dx = \frac{x^2}{4} - \frac{x\sin(2ax)}{4a} - \frac{\cos(2ax)}{8a^2} + c$
- $\int xe^{x^2}dx = e^{x^2}/2 + c$
- $\int xe^{ax} = \frac{e^{ax}(ax-1)}{a^2} + c$
- $\int \frac{x}{x^2+1}dx = \frac{1}{2}\ln(1+x^2) + c$