

Source: [KBhMATH401SubIndex](#)

## 1 | Intergration

Antiderivatives table

Function	Antidervative
$x^n$	$\frac{x^{n+1}}{n+1} + c, x \neq -1$
$a f(x)$	$a * (f(x)dx)$
$\frac{1}{x}$	$\ln(  x  )$
$\sin(at)$	$-\frac{\cos(t)}{a}$
$\cos(at)$	$\frac{\sin(t)}{a}$
$e^a$	$e^a$
$\frac{1}{1+(ax)^2}$	$\tan^{-1}(ax)$
$\frac{a}{\sqrt{k^2-(ax)^2}}$	$\sin^{-1}(\frac{ax}{k})$
$\frac{-1}{\sqrt{k^2-(ax)^2}}$	$\cos^{-1}(\frac{ax}{k})$
$\ln(x)$	$x \ln(x) - x$ <= remember this
$\int f(x)g'(x)dx$	$f(x)g(x) - \int f'(x)g(x)dx$
Arc Length of function $f(x)$	$\sqrt{1 + f'(x)^2}dx$
Arc length of polar function $x(t), y(t)$	$\sqrt{x'(t)^2 + y'(t)^2}(dt)$
$r(\theta)$	$\int_a^B (r(\theta)^2)d\theta$
$\sec^2(x)$	$\tan(x)$

Also, fun other things

Function	Other Function
$\cos 2\theta$	$1 - 2\sin^2\theta$
$\cos 2\theta$	$2\cos^2\theta - 1$
$\sec^2 x - 1$	$\tan^2 x$

### 1.1 | Some Limits Too!

$$\lim_{\theta \rightarrow \infty} \tan^{-1}(\theta) = \frac{\pi}{2}$$

With the reverse product rule, try to make f(x) the simpler derivative, and g(x) the simpler antiderivative

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### 1.2 | Useful thing

- Intergration by Parts (reverse product rule) (the  $f(x)g'(x)$  rule above)
- u-Substitution (reverse chain rule)
- Completing the Square + arcsin/arctan
- Long divide, then intergrate