**Source:** KBhMATH401SubIndex

# 1 | Intergration

Antiderivatives table

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

## 1.1 | Some Limits Too!

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

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)
- Compleeting the Square + arcsin/arctan
- Long divide, then intergrate