DIFFERENTIATION		INTEGRATION (constants of integration omitted)	
Function	**Derivative**	**Function**	**Integral**
x^n	nx^{n-1}	x^n	$\frac{x^{n+1}}{n+1}\ (n \neq -1)$
$(ax+b)^n$	$an(ax+b)^{n-i}$	$(ax+b)^n$	$\frac{(ax+b)^{n+1}}{a(n+1)}\ (n \neq -1)$
$(f(x))^n$	$n(f(x))^{n-1} f'(x)$	$f'(x)(f(x))^n$	$\frac{(f(x))^{n+1}}{n+1}\ (n \neq -1)$
$\ln x$	$\frac{1}{x}$	$\frac{1}{x}$	$\ln\lvert x\rvert$
$\ln(ax+b)$	$\frac{a}{ax+b}$	$\frac{1}{ax+b}$	$\frac{1}{a}\ln(ax+b)$
$\ln(f(x))$	$\frac{f'(x)}{f(x)}$	$\frac{f'(x)}{f(x)}$	$\ln\lvert f(x)\rvert$
e^x	e^x	e^x	e^x
e^{ax+b}	ae^{ax+b}	e^{ax+b}	$\frac{1}{a}e^{ax+b}$
$e^{f(x)}$	$f'(x)e^{f(x)}$	$f'(x)e^{f(x)}$	$e^{f(x)}$
Note: Calculus involving trig functions assumes you are working in RADIANS			
$\sin x$	$\cos x$	$\cos x$	$\sin x$
$\cos x$	$-\sin x$	$\sin x$	$-\cos x$
$\tan x$	$\sec^2 x$	$\sec^2 x$	$\tan x$
$\sin(ax+b)$	$a\cos(ax+b)$	$\cos(ax+b)$	$\frac{1}{a}\sin(ax+b)$
$\sin(f(x))$	$f'(x)\cos(f(x))$	$f'(x)\cos(f(x))$	$\sin(f(x))$
similarly for cos and tan		similarly for sin and sec^2	
uv Product Rule	$v\frac{du}{dx}+u\frac{dv}{dx}$	$u\frac{dv}{dx}$ Integration by parts	$uv-\int v\frac{du}{dx}dx$
$\frac{u}{v}$ Quotient Rule	$\frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v^2}$	$\cos^2 x$	Use double angle formula $\cos^2 x=\frac{1}{2}+\frac{1}{2}\cos 2x$
$x=f(t), y=g(t)$ Parametric differentiation	$\frac{dy}{dx}=\frac{dy}{dt}\Big/\frac{dx}{dt}$	$\sin^2 x$	Use double angle formula $\sin^2 x=\frac{1}{2}-\frac{1}{2}\cos 2x$
$y=f(u), u=g(x)$ Chain Rule	$\frac{dy}{dx}=\frac{dy}{du}\times\frac{du}{dx}$	Method of substitution: **1.** substitute for dx in terms of du **2.** substitute for x in terms of u **3.** change limits to u Always look for simplifications before the next stage.	
Useful Relation	$\frac{dy}{dx}=1\div\frac{dx}{dy}$	General method: **1.** Is it a standard integral? **2.** Is it a reverse chain rule?(can you spot a function and its derivative?) **3.** Can you split it up into two or more easier integrals? e.g. $\int\frac{x+1}{x}dx=\int 1+\frac{1}{x}dx$. **4** Can you use partial fractions? **5.** Can you use a trig formula? **6.** Can you do it by parts? **7.** Can you use a substitution? More than one method may work; which is the easiest?	

Warning: You cannot differentiate or integrate the parts of a product or quotient separately: consider multiplying or dividing out first or using another method.