Summary of rules for differentiation and integration

Differentiation

$y(x)$	$\frac{dy}{dx}$
c	0
x^n	nx^{n-1}
e^{ax+b}	ae^{ax+b}
$\sin(ax+b)$	$a\cos(ax+b)$
$\cos(ax+b)$	$-\ a\sin(ax+b)$
$\log_e(ax+b)$	$\frac{a}{ax+b}$

Linear combinations (a and b constants):

$$\frac{d}{dx}\left(au(x)+bv(x)\right) = a\frac{du}{dx} + b\frac{dv}{dx}$$

Product:

$$\frac{d}{dx}(u(x)v(x)) = u\frac{dv}{dx} + v\frac{du}{dx}$$

Quotient:

$$\frac{d}{dx}\left(\frac{u(x)}{v(x)}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

Chain ("function of a function")

$$\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$$

Integration

$y(x)$	$\int y(x)\ dx$
0	C
$x^n\ (n \neq -1)$	$\frac{1}{n+1}x^{n+1} + C$
$\frac{1}{x}$	$\log_e(x) + C$
$\frac{1}{ax+b}$	$\frac{1}{a}\log_e(ax+b) + C$
e^{ax+b}	$\frac{1}{a}e^{ax+b} + C$
$\sin(ax+b)$	$-\frac{1}{a}\cos(ax+b) + C$
$\cos(ax+b)$	$\frac{1}{a}\sin(ax+b) + C$

Linear combinations (a and b constants):

$$\int \left(au(x)+bv(x)\right)\ dx = a\int u(x)\ dx + b\int v(x)\ dx$$