Picard-Lindelöf Theorem.

Let $\mathcal{D}$ be the rectangular domain in the xy plane defined as $\mathcal{D} = (|x-a| \leq A,\ |y-b| \leq B)$ and suppose $f(x,y)$ is a function defined on $\mathcal{D}$ which satisfies the following conditions:

(i) $f(x,y)$ is continuous and therefore bounded in $\mathcal{D}$

(ii) the parameters A and B satisfy $A \leq B/M$ where $M = max_{\mathcal{D}}|f(x,y)|$

(iii) $|\frac{\partial f}{\partial y}|$ is bounded in $\mathcal{D}$.

Then there exists a unique solution on $\mathcal{D}$ to the initial value problem

$$\frac{dy}{dx} = f(x,y), \quad y(a) = b.$$

Exact first-order ODEs:

If the equation

$$P(x,y) + Q(x,y)\,\frac{dy}{dx} = 0$$

is exact, its solution can be found in the form $F(x,y) = Const.$ where

$$P = \frac{\partial F}{\partial x} \quad \text{and} \quad Q = \frac{\partial F}{\partial y}$$

Some derivatives

In the table below, a, b and c are constants.

$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$1/\cos^2 x$
$\sinh x$	$\cosh x$
$\cosh x$	$\sinh x$
$\tanh x$	$1/\cosh^2 x$
$\log x$	$\frac{1}{x}$

End of Appendix.