0.1 Implicit and explit differential equations

An ordinary differential equation is one with only one independent variable. For example:

$\frac{dy}{dx} = f(x)$

The order of a differential equation is the number of differentials of y included. For example one with the second derivative of y is of order 2.

Ordinary equations can can either implicit or explicit. An explicit function shows the highest order derivative as a function of other terms.

An implicit function is one which is not explicit.

A linear ODE is an explicit ODE where the derivative terms of y do not multiply together, that is, in the form:

$y^{(n)} = \sum_i a_i(x)y^{(i)} + r(x)$

0.1.1 First-order ODEs

We have an evolution:

$\frac{dy}{dt} = f(t, y)$

And a starting condition:

$y_0 = f(t_0)$

We now discuss various ways to solve these.