Separable Equations

Separable Equation: If the right-hand side of the equation

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

can be expressed as a function $g(x)$ that depends only on x times a function $p(y)$ that depends only on y, then the differential equation is called **separable**. In other words, a first-order equation is separable if it can be written in the form

$$\frac{dy}{dx} = g(x)p(y)$$

Method for solving separable equations

To solve the equation

$$\frac{dy}{dx} = g(x)p(y)$$

multiply by dx and by $h(y) \equiv 1/p(y)$ to obtain

$$h(y)dy = g(x)dx$$

Then integrate both sides:

$$\int h(y)dy = \int g(x)dx$$
$$H(y) = G(x) + C$$

where we have merged the two constants of integration into a single symbol C. The last equation gives an implicit solution to the differential equation.