1st Order Ordinary Differential Equations

$$\frac{dx}{dt} = f(x)g(x)$$

Seperation of variables

$$\frac{dx}{dt} = f(x)g(x)$$

$$\frac{dx}{f(x)} = g(x)dt$$

$$\int \frac{dx}{f(x)} = \int g(x)dt$$

Example

$$\frac{dx}{dt} = -kx^2$$

$$\int \frac{dx}{x^2} = \int -kdt$$

$$-\frac{1}{2x} + C = -kt + C$$

The two constants C from both sides, can be added together, even though they are different from each other, this is because at this point we don't know what the value they hold. And so we can assign a new constant D.