

A. Separable, first order differential equations.

This means that the function $f(x,y)$ can be expressed as a product or quotient of a function of x and a function of y : Examples: $f(x,y) = xy$ or $-\frac{x^2}{y}$, or y/x^3 .

METHOD of SEPARATION of VARIABLES:

Write the equation as $\frac{dy}{dx} = \frac{g(x)}{h(y)}$

and take apart as $h(y)dy = g(x)dx$.

Now integrate each side separately, the left hand side with respect to y and the right hand side with respect to x .

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

This step can be justified by the Chain Rule, but it is only legitimate under the conditions that the variables can be totally separated. Then solve (if possible) $y = y(x)$. This will give the general solution.