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Condition for differential equation of first order and first degree to be homogenous

Differential equation should be a function of

$$\frac{y}{x}$$

General expression for homogenous differential equation of first order and first degree

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

Derivation of solution of homogenous differential equation

- $$\frac{y}{x} = v$$

- $$y = vx$$

- $$\frac{dy}{dx} = v + x\frac{dv}{dx}$$

- $$f(v) = v + x\frac{dv}{dx}$$

- $$\frac{dv}{f(v) - v} = \frac{dx}{x}$$

Expression of solution of homogenous differential equation

$$\frac{dv}{f(v) - v} = \frac{dx}{x}$$