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# of solutions to a 1<sup>st</sup> order ode  
 $y'^2 + y^2 = 0$  has only 1 real solution,  
 $y = 0$

$y'^2 + (y^2 - 1)^2 = 0$  has 2 real solutions,  
 $y = \pm 1$ .

Role of constant in general solution

If the ode is of the form

$y' = g(x)$  &  $g$  is continuous

then we know that

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

Constant  
is  
Additive

But it is not the case that  
all solutions to 1<sup>st</sup> order odes  
differ by an <sup>additive</sup>  $\sqrt{\text{constant}}$ . For instance,

$$y' = y$$

has solutions of the form  $y(x) = Ke^x$ .

In this case, the constant is multiplicative.