Water tank POTW #14

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Let $y(t)$ denote the number of gallons of water in the tank at time t, measured in seconds from now. Then the amount of water in the tank is the solution to the IVP

$$y' = 1 - (y/100), \qquad y(0) = 0. \tag{1}$$

The solution to IVP (1) is

$$y(t) = 100(1 - e^{-t/100}). \tag{2}$$

Solving equation (2) for t when $y = 50$ and we get

$$t = 100 \cdot \ln 2 \approx 69.3 \text{ seconds.}$$