

Quiz 10: Section 9.1, Problem 30

Solve the following initial value problem:

$$y' - 2y + 4 = 0, \quad y(1) = 4$$

We separate:

$$\begin{aligned} y' - 2y + 4 &= 0 \\ \frac{dy}{dx} &= 2y - 4 \\ \frac{1}{2y - 4} dy &= dx \\ \frac{1}{2} \ln |2y - 4| &= x + C \end{aligned}$$

Since $y(1) = 4$, then $\frac{1}{2} \ln(4) = 1 + C$ so $C = \frac{1}{2} \ln(4) - 1$. Therefore,

$$\begin{aligned} \frac{1}{2} \ln |2y - 4| &= x + \frac{1}{2} \ln(4) - 1 \\ \ln |2y - 4| &= 2 \left(x + \frac{1}{2} \ln(4) - 1 \right) \\ 2y - 4 &= e^{2(x + \frac{1}{2} \ln(4) - 1)} \\ 2y &= e^{2(x + \frac{1}{2} \ln(4) - 1)} + 4 \\ y &= \frac{e^{2(x + \frac{1}{2} \ln(4) - 1)} + 4}{2} \end{aligned}$$