

Answer on Question #86482 – Math – Differential Equations

Question

If $y = 2x + Ce^x$ is a solution of the differential equation $\frac{dy}{dx} - y = 2(1 - x)$ then find the particular solution satisfied by $x=0, y=3$.

Solution

Let's check that $y = 2x + Ce^x$ is a general solution of the differential equation

$\frac{dy}{dx} - y = 2(1 - x)$, by substitution it into the equation:

$$\frac{d}{dx}(2x + Ce^x) - (2x + Ce^x) = 2 + Ce^x - 2x - Ce^x = 2 - 2x = 2(1 - x)$$

Therefore $y = 2x + Ce^x$ is a general solution of the differential equation.

Then we find the particular solution by finding C when $x=0, y=3$, so

$$3 = 2 \cdot 0 + Ce^0 \Rightarrow C = 3$$

Thus, the particular solution is

$$y = 2x + 3e^x$$

Answer: The particular solution is $y = 2x + 3e^x$.