Problem 8

In each of Problems 7 through 14, verify that each given function is a solution of the differential equation.

\[ y'' + 2y' - 3y = 0; \quad y_1(t) = e^{-3t}, \quad y_2(t) = e^t \]

Solution

\[
\begin{align*}
\frac{d^2}{dt^2}(e^{-3t}) + 2\frac{d}{dt}(e^{-3t}) - 3e^{-3t} & = 0 \\
9e^{-3t} - 6e^{-3t} - 3e^{-3t} & = 0 \\
0 & = 0
\end{align*}
\]

The first solution is verified.

\[
\begin{align*}
\frac{d^2}{dt^2}(e^t) + 2\frac{d}{dt}(e^t) - 3e^t & = 0 \\
e^t + 2e^t - 3e^t & = 0 \\
0 & = 0
\end{align*}
\]

The second solution is verified.