Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Does the differential equation \( \frac{dH}{dt} = 325 - H \) have the function \( H = 325 - Ae^t \) as a solution?

\[
\begin{align*}
H &= 325 - Ae^{-t} \\
H' &= -Ae^{-t} \\
H'' &= Ae^{-t} - 1
\end{align*}
\]

\[
Ae^{-t} = 25 - [325 - Ae^{-t}]
\]

\[
Ae^{-t} = Ae^{-t} \quad \text{Great}
\]

YES! \( 325 - Ae^{-t} \) is a solution to the differential equation \( 325 - H \).

2. Does the differential equation \( y'' - 2y' - 15y = 0 \) have the function \( y = e^{5t} \) as a solution?

\[
y = e^{5t}, \quad y' = 5e^{5t}, \quad y'' = 25e^{5t}
\]

\[
25e^{5t} - 2(5e^{5t}) - 15(e^{5t}) = 0
\]

\[
e^{5t}(25 - 10 - 15) = 0
\]

\[
e^{5t} \cdot 0 = 0 \quad \text{Great}
\]

YES! \( y = e^{5t} \) is a solution.

Great