For the following differential equation, use the guess-and-test method to find two nonzero solutions that are not multiple of each other. For each solution, plot both its solution curve in the uv-plane and its $y(t)$- and $v(t)$-graphs.

\[
\frac{d^2y}{dt^2} + 7\frac{dy}{dt} + 10y = 0.
\]

Assume that the solution is $y(t) = e^{\lambda t}$.

Then \[
\frac{d^2y}{dt^2} + 7\frac{dy}{dt} + 10y = \lambda^2 e^{\lambda t} + 7\lambda e^{\lambda t} + 10 e^{\lambda t} = (\lambda^2 + 7\lambda + 10) e^{\lambda t}.
\]

Need $\lambda^2 + 7\lambda + 10 = 0 \Rightarrow (\lambda + 2)(\lambda + 5) = 0 \Rightarrow \lambda = -2 \text{ or } -5$.

We have two solutions $y_1(t) = e^{-2t}$, $y_2(t) = e^{-5t}$.

The corresponding $v_1(t) = -2e^{-2t}$, $v_2(t) = -5e^{-5t}$.