MATH 6701 - Quiz 2

Justify all your answers

Problem 1 (8 points): Solve

\[ y'' + 2y' + y = 2e^{-x} + 1 \]

with

\[ y(0) = 2 \quad y'(0) = 1 \]

Problem 2 (8 points): Find all the solutions to

\[ \dot{x} = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} x \]

Problem 3 (7 points): Find the equilibrium points and their stability in the system

\[ \dot{x} = xy - 2y - x + 2 \]
\[ \dot{y} = xy + x \]

Problem 4 (7 points): Draw the phase portrait and classify the origin of the system

\[ \dot{x} = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} x \]