Example. Consider the initial-value problem (IVP) for the constant-coefficient system

\[ x' = \begin{pmatrix} 1 & 1 \\ 4 & 1 \end{pmatrix} x, \quad t > 0, \quad x(0) = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \]

(a) Show that

\[ x^{(1)}(t) = \begin{pmatrix} 1 \\ 2 \end{pmatrix} e^{3t}, \quad x^{(2)}(t) = \begin{pmatrix} 1 \\ -2 \end{pmatrix} e^{-t} \]

are independent solutions of the system of ODEs.

(b) Find the solution of the IVP and describe its behavior.
Continued.