Consider the initial-value problem
\[ \ddot{\mathbf{x}} = A\mathbf{x} + F(t) \quad \text{with} \quad \mathbf{x}(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \]
where
\[ A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix} \quad \text{and} \quad F(t) = e^t \begin{bmatrix} 1 \\ 1 \end{bmatrix}. \]

The assignment:

(A) Solve the initial-value problem by
   (i) explicitly computing \( e^{At} \)
   (ii) explicitly using \( e^{At} \) in the Variation-of-Parameters method
   (iii) explicitly writing down the general-solution formula for the driven system above
   (iv) explicitly applying the initial values to the general-solution formula.

(B) Solve this initial-value problem using the Laplace-Transform method.