

8.1]

$$7.) X' = \begin{pmatrix} 4 & 2 \\ -1 & 3 \end{pmatrix} X + \begin{pmatrix} 1 \\ -1 \end{pmatrix} e^t$$

$$X = \begin{pmatrix} x(t) \\ y(t) \end{pmatrix} \quad X' = \begin{pmatrix} x'(t) \\ y'(t) \end{pmatrix}$$

$$\Rightarrow \begin{pmatrix} x'(t) \\ y'(t) \end{pmatrix} = \begin{pmatrix} 4 & 2 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} x(t) \\ y(t) \end{pmatrix} + \begin{pmatrix} e^t \\ -e^t \end{pmatrix}$$

$$\begin{pmatrix} x'(t) \\ y'(t) \end{pmatrix} = \begin{pmatrix} 4x(t) + 2y(t) \\ -x(t) + 3y(t) \end{pmatrix} + \begin{pmatrix} e^t \\ -e^t \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 4x + 2y + e^t \\ -x + 3y - e^t \end{pmatrix}$$

$$\Rightarrow \begin{cases} x' = 4x + 2y + e^t \\ y' = -x + 3y - e^t \end{cases}$$