

## Section 7.9

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**Exercise 1.** Find the general solution of the given systems of equations

$$X'(t) = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix} X + \begin{pmatrix} e^{2t} \\ 0 \end{pmatrix}$$

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

$$X'(t) = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} X + \begin{pmatrix} -\cos 2t \\ \sin 2t \end{pmatrix}.$$

**Exercise 2.** Find a particular solution to

$$X'(t) = \begin{pmatrix} 4 & -2 \\ 8 & -4 \end{pmatrix} X(t) + \begin{pmatrix} t^{-3} \\ -t^{-2} \end{pmatrix}$$

**Exercise 3.** Solve the systems

$$\begin{cases} x'(t) = y(t) + t \\ y'(t) = x(t) - 1 \end{cases} \quad x(0) = 2, \quad y(0) = 1.$$

$$X'(t) = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix} X(t) + \begin{pmatrix} 1 \\ -1 \end{pmatrix} e^t, \quad X(0) = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$$