Exercises for Section 8.2

1. Consider the linear system
\[
\begin{align*}
x_1' &= -7x_1 + 8x_2 + e^{2t} \\
x_2' &= -6x_1 + 7x_2 + 2
\end{align*}
\]
Solve this system (a) by diagonalization and (b) by variation of parameters.

2. Consider the linear system
\[
\begin{align*}
x_1' &= -17x_1 - 10x_2 + 5t \\
x_2' &= 30x_1 + 18x_2 - e^{3t}
\end{align*}
\]
Solve this system (a) by diagonalization and (b) by variation of parameters.

3. Consider the linear system
\[
\begin{align*}
x_1' &= -x_1 - 2x_2 + e^{2t} \\
x_2' &= 4x_1 + 5x_2 - 2e^{-2t} + 4
\end{align*}
\]
Solve this system (a) by diagonalization and (b) by variation of parameters.

4. Consider the linear system
\[
\begin{align*}
x_1' &= -7x_1 + 4x_2 + 3 \\
x_2' &= -12x_1 + 7x_2 - 2t
\end{align*}
\]
Solve this system (a) by diagonalization and (b) by variation of parameters.

5. Consider the linear system
\[
\begin{align*}
x_1' &= 2x_2 + 3t \\
x_2' &= -2x_1
\end{align*}
\]
Solve this system by variation of parameters.

6. Consider the linear system
\[
\begin{align*}
x_1' &= 9x_1 - 5x_2 + t \\
x_2' &= 16x_1 - 9x_2 - t
\end{align*}
\]
Solve this system (a) by diagonalization and (b) by variation of parameters.

7. Solve the following linear system by variation of parameters:
\[
\begin{align*}
x_1' &= -3x_1 + x_2 + 2e^t \\
x_2' &= -4x_1 + x_2 + 3t
\end{align*}
\]

8. Solve the following linear system by variation of parameters:
\[
\begin{align*}
x_1' &= 9x_1 - 5x_2 + \sin t \\
x_2' &= 16x_1 - 9x_2 - \sin t
\end{align*}
\]