Section 3.6

Note: There are two versions of initial conditions for the problem 4. The solution in the manual is for \( x(0) = 0, \ x'(0) = 0 \). The solution in the correction part is for \( x(0) = 25, \ x'(0) = 0 \).

**Problem 8**

\[
x_{sp}(t) = \frac{16}{125} \cos 5t - \frac{12}{125} \sin 5t \\
= \frac{4}{25} \cos(5t - \alpha),
\]

where \( \alpha = 2\pi - \tan^{-1}(\frac{3}{4}) \).

**Problem 12** (an answer in the manual is correct and it is same as the following:)

\[
x_{sp} = -\frac{25}{87} \cos 5t - \frac{10}{87} \sin 5t \\
= \frac{\sqrt{725}}{87} \cos(5t - \alpha),
\]

where \( \alpha = \pi + \tan^{-1}(\frac{2}{5}) \). Hence,

\[
x(t) = e^{-3t} \left( \frac{25}{87} \cos 2t + \frac{125}{174} \sin 2t \right) + \frac{\sqrt{725}}{87} \cos(5t - \alpha) \\
= \frac{18125}{174} e^{-3t} \cos(2t - \tan^{-1}(\frac{5}{2})) + \frac{\sqrt{725}}{87} \cos(5t - \alpha) \\
= \frac{25\sqrt{29}}{174} e^{-3t} \cos(2t - \tan^{-1}(\frac{5}{2})) + \frac{\sqrt{725}}{87} \cos(5t - \alpha).
\]