EE 202
Quiz #3

Find \( i(t) \) as \( t \to \infty \). (Steady-state value)

\[ e_2 = 6 \angle 26.63^\circ \]
\[ i = e_2 / 2 = 3 \angle 37^\circ \]
\[ i = 8 \cos (4t - 32^\circ) \text{ A} \]

KCL @ supernode:
\[
\frac{e_1 - 12}{5} + \frac{e_1 - 45}{1} + \frac{e_2 - 45 - e_2}{-3} = 0. \quad (1)
\]

KCL:
\[
\frac{e_2}{2} + \frac{e_2 - 12}{2} + \frac{e_2 - (e_1 - 45)}{-5} = 0. \quad (2)
\]

\[
\begin{bmatrix}
1 + j & -j \\
-j & 1 + j
\end{bmatrix}
\begin{bmatrix}
e_1 \\
e_2
\end{bmatrix}
= 
\begin{bmatrix}
-4 - 25 \\
+10
\end{bmatrix}
\]

\[ e_2 = \begin{bmatrix}
\frac{1 + j}{2} + j \\
-5 + 10
\end{bmatrix}
\]

\[ e_2 = \frac{(1 + j)^2 + 1}{12 + 63} = \frac{\frac{23}{2} + 1}{\sqrt{25 + \frac{1}{4} + \frac{1}{2}}} \]

\[ e_2 = \frac{\sqrt{180}}{\frac{63}{2} + \frac{1}{2}} \]