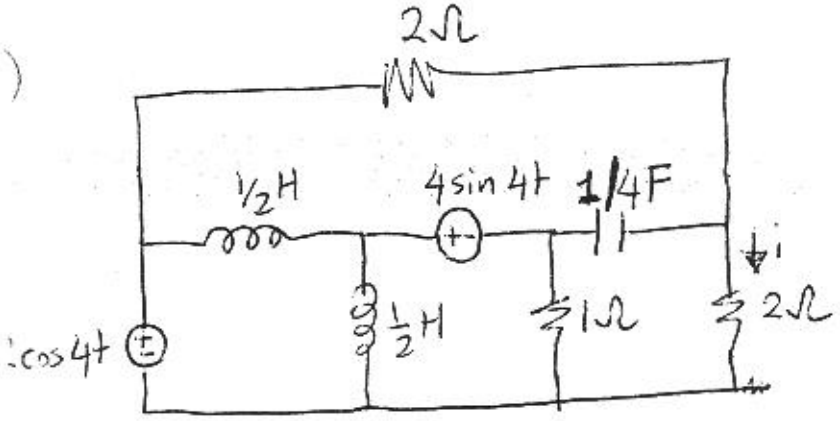
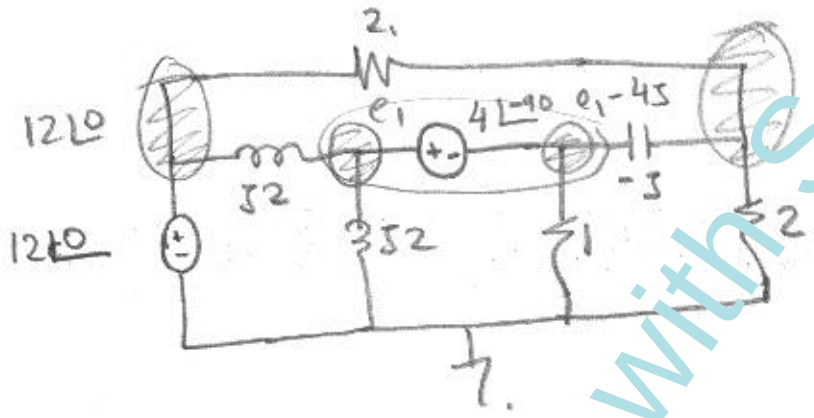
EE 202
Quiz #3

12th March, 2006.



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



$e_2 = 6\angle 26-63^\circ$

$i = e_2/2 = 3\angle -37^\circ$

$i = 3\cos(4t-37^\circ)$ A.

KCL @ supernode:

$$\frac{e_1-12}{j2} + \frac{e_1}{j2} + \frac{e_1-4j}{1} + \frac{e_1-4j-e_2}{-j} = 0 \quad (1)$$

KCL @ e_2:

$$\frac{e_2}{2} + \frac{e_2-12}{2} + \frac{e_2-(e_1-4j)}{-j} = 0 \quad (2)$$

$$\begin{bmatrix} 1+j & -j \\ -j & 1+j \end{bmatrix} \begin{bmatrix} e_1 \\ e_2 \end{bmatrix} = \begin{bmatrix} -4-2j \\ +10 \end{bmatrix}$$

Cramer's: $e_2 = \dfrac{\begin{vmatrix} 1+j & -4-2j \\ -j & 10 \end{vmatrix}}{(1+j)^2+1}$

$= \dfrac{12+6j}{2j+1}$

$e_2 = \dfrac{\sqrt{180}\,\angle \tan^{-1}(1/2)}{\sqrt{5}\,\angle \tan^{-1}(1/2)} = 6\angle 26^\circ - 63^\circ$