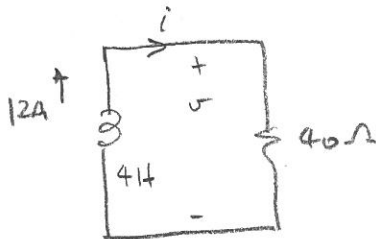
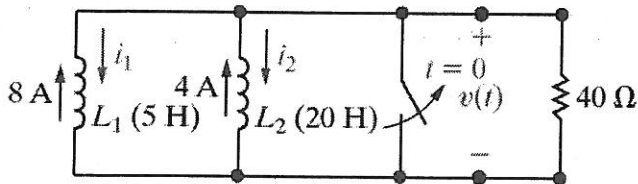


ALTERNATIVE SOLUTION

ECE222

Quiz 1

For the circuit below find an expression for the inductor current $i_1, t \geq 0$. (Show all your work).



$$\tau = \frac{L}{R} = \frac{4}{40} = 0.1$$

$$i(0) = 12$$

$$\Rightarrow i(t) = 12 e^{-10t}, \quad t \geq 0$$

i IS SPLIT BETWEEN i_1 AND i_2 AND SINCE INDUCTORS COMBINE LIKE RESISTORS WE CAN USE CURRENT DIVIDER RULE TO FIND i_1 GIVEN i

$$i_1 = -\frac{L_2}{L_1 + L_2} i$$

$$= -\frac{20}{25} i = -\frac{4}{5} i$$

SO, SO FAR IT WILL GIVE

$$i_1(t) = -\frac{4}{5} 12 e^{-10t} = -\frac{48}{5} e^{-10t} \quad (1)$$

HOWEVER WE WILL NEED TO ADJUST FOR THE INITIAL CONDITION WHICH IS $i_1(0) = 8$, HOWEVER (1) GIVES $i_1(0) = -\frac{48}{5}$ SO TO ADJUST WE ADD $\frac{48}{5} - 8$ WHICH GIVES

$$i_1(t) = -\frac{48}{5} e^{-10t} + \frac{48}{5} - 8$$

$$i_1(t) = 1.6 - 9.6 e^{-10t}, \quad t \geq 0$$