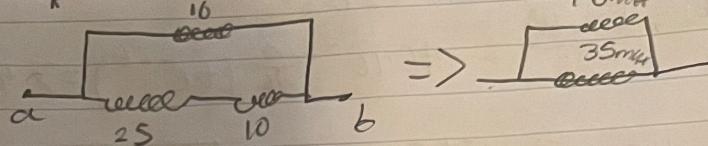


Homework #7-4

problem 6) a) 60, 20, 30 in parallel

$$\frac{1}{L_{\text{eq},R}} = \frac{1}{20} + \frac{1}{60} + \frac{1}{30} = \frac{3+1+2}{60} = \frac{6}{60} = \frac{1}{10}$$



$$\frac{L_1 \cdot L_2}{L_1 + L_2}$$

$$L_{ab} = \frac{10 \cdot 35}{10 + 35} = \frac{350}{45} = \boxed{\frac{70}{9}}$$

$$b) v(t) = R_1 i(t) + L_1 \left( \frac{di(t)}{dt} \right) \Rightarrow v(t) = 12(2t e^{-10t}) + 200 \cdot 10^{-3} \cdot \frac{d}{dt}(2t e^{-10t})$$

$$\frac{d(v \cdot v)}{dt} = v \frac{dv}{dt} + v \frac{dv}{dt} \Rightarrow v(t) = 24te^{-10t} + 200 \cdot 10^{-3} \cdot 2 \left[ e^{-10t} + t \frac{d}{dt} e^{-10t} \right]$$

$$\Rightarrow v(t) = 24te^{-10t} + 400 \cdot 10^{-3} \left[ e^{-10t} + t \cdot (-10) \cdot e^{-10t} \right]$$

$$* \cdot \frac{d}{dt} e^{at} = ae^{at}$$

$$v(t) = 24te^{-10t} + 400 \cdot 10^{-3} (e^{-10t} - 10te^{-10t})$$

$$v(t) = 24te^{-10t} + 0.4e^{-10t} - 4te^{-10t}$$

$$v(t) = 20te^{-10t} + 0.4e^{-10t}$$

$$v(t) = (0.4 + 20t)e^{-10t}$$