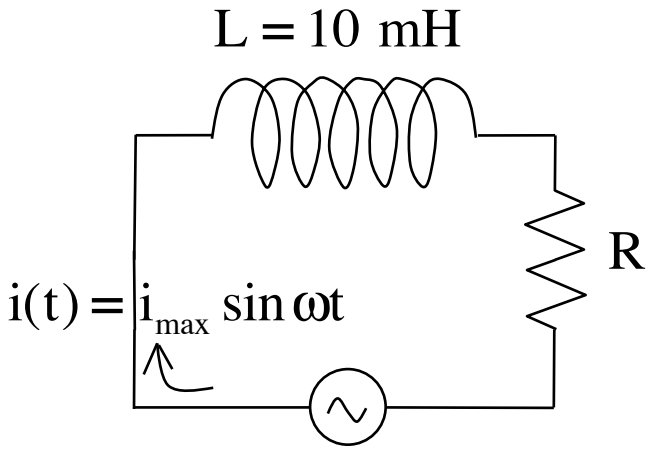
Problem 32.7



Although the AP folks won't be giving you a formal AC Circuits problem, that is essentially what this is. Fortunately, because EMF's are "change of current" related, we can deal with it.

The current is:

$$i(t) = i_{max} \sin \omega t$$

where $\omega = 2\pi\nu = 2\pi(60\ \text{Hz}) = 377$

The EMF is:

$$\begin{aligned}
\varepsilon_{induced} &= -L\frac{di(t)}{dt} \\
&= -L\left[\frac{d\left[i_{max} \sin \omega t\right]}{dt}\right] \\
&= -L\left[i_{max}\omega \cos \omega t\right] \\
&= -(.01)\left[(5)(377)\cos(377t)\right] \\
&= -18.8\cos(377t)
\end{aligned}$$