Name:

Physics 51
Homework #14
October 27, 2016

# 36-E21, 36-P9

**36-E21** In the circuit shown in Fig. 36-20, $\varepsilon = 10\,\text{V}$, $R_1 = 5.0\,\Omega$, $R_2 = 10\,\Omega$, and $L = 5.0\,\text{H}$. For the two separate conditions (I) switch S just closed and (II) switch S closed for a long time, calculate

(a) the current $i_1$ through $R_1$,

(b) the current $i_2$ through $R_2$,

(c) the current $i$ through the switch,

(d) the potential difference across $R_2$,

(e) the potential difference across $L$, and

(f) $\frac{di_2}{dt}$.

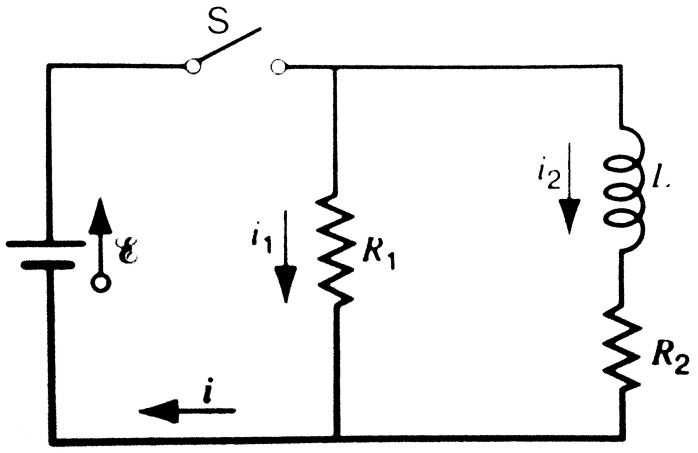


**FIGURE 36-20. Exercise 21.**

■

**36-P9**

(a) Find an expression for the energy density as a function of the radial distance $r$ of a toroid of rectangular cross section.

(b) Integrating the energy density over the volume of the toroid, calculate the total energy stored in the field of the toroid.

(c) Using Eq. 36-10, evaluate the energy stored in the toroid directly from the inductance and compare with (b).

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