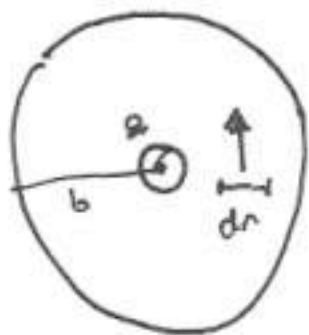


# Homework 13 Solution

30.48.



$$\oint \vec{B} \cdot d\vec{\ell} = \mu_0 I$$

$$2\pi r \cdot B = \mu_0 I$$

$$B = \frac{\mu_0 I}{2\pi r}$$

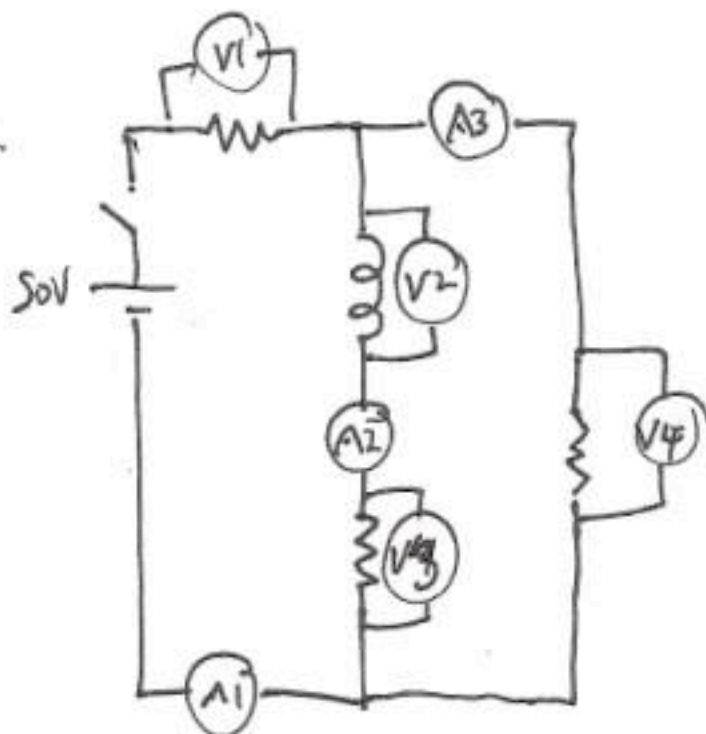
$$d\Phi_B = B l dr = \frac{\mu_0 I l dr}{2\pi r}$$

$$\Phi_B = \int_a^b \frac{\mu_0 I l dr}{2\pi r} = \frac{\mu_0 I l}{2\pi} \ln \frac{b}{a}$$

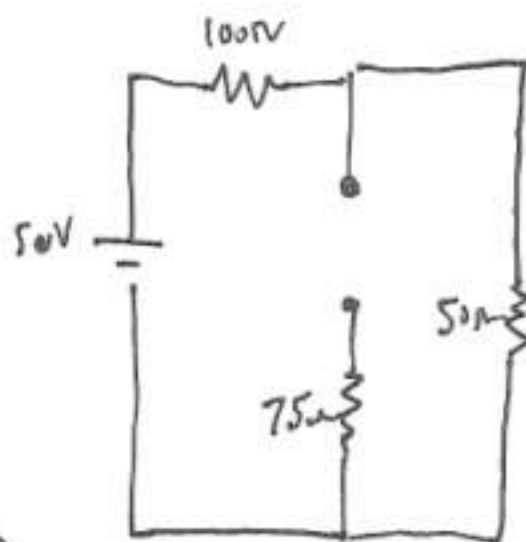
$$L = \frac{N\Phi}{I} = \frac{\mu_0 l}{2\pi} \ln \frac{b}{a}$$

$$U = \frac{1}{2} L I^2 = \frac{\mu_0 l I^2}{4\pi} \ln \frac{b}{a}$$

30.62



Close switch  $i_L = 0$  at  $t = 0^+$ .  
Circuit now;



Long time after switch closed

$V_L = 0 = (V_2)$

Circuit now;

$$R_{eq} = 100 + \left( \frac{1}{75} + \frac{1}{50} \right)^{-1}$$

$$= 130 \Omega$$

$$I = \mathcal{E} / R_{eq} = 5/13 \text{ A}$$

$$= (A_1)$$

$$(V_1) = \frac{5 \text{ A}}{13} \cdot 100 \Omega = \left( \frac{500}{13} \right)$$

$$(V_3) = \frac{650}{13} - \frac{500}{13} = \left( \frac{150}{13} \right)$$

$$= (V_4)$$

$$(A_2) = \frac{V_3}{75 \Omega} = \left( \frac{2}{13} \text{ A} \right)$$

$$(A_3) = \frac{3}{13} \text{ A}$$

$$(A_1) = 50 \text{ V} / 150 \Omega = 1/3 \text{ A}$$

$$(A_2) = 0$$

$$(A_3) = 1/3 \text{ A}$$

$$(V_1) = 100 \Omega \cdot 1/3 \text{ A} = 33 \frac{1}{3} \text{ V}$$

$$(V_2) = 16 \frac{2}{3} \text{ V}$$

$$(V_3) = 0$$

$$(V_4) = 16 \frac{2}{3} \text{ V}$$