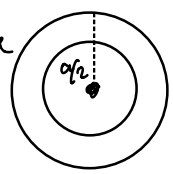
Ch. 7 7.12, 15, 34

12) 

$B(t) = B_0 \cos(\omega t)\,\hat{z}$

$I(t) = ?$

$\Phi = \int B \cdot da$

$\mathcal{E} = -\frac{d\Phi}{dt}$

$\Phi = \pi \left(\frac{a}{2}\right)^2 B$

$\mathcal{E} = -\frac{d}{dt}\left(\frac{\pi a^2}{4} B_0 \cos(\omega t)\right)$

$= \frac{\pi}{4} a^2 B_0 \omega \sin(\omega t)$ $\qquad I = \frac{\mathcal{E}}{R}$

$I = \frac{\pi a^2}{4R} B_0 \omega \sin(\omega t)$

15) 

$B = \begin{cases} \mu_0 n I \ \hat{z} & \text{inside} \\ 0 & \text{else} \end{cases}$

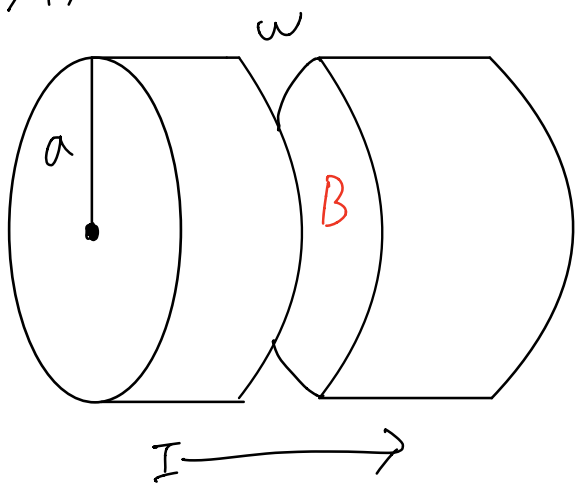
$\Phi = B \pi s^2 = \mu_0 n I \pi s^2$

$E(2s\pi) = -\frac{d}{dt} \mu_0 n I \pi s^2$

$\frac{-\mu_0 n \pi s^2 \frac{dI}{dt}}{2s\pi}$ $\qquad E = \frac{-\mu_0 n s}{2} \frac{dI}{dt}\hat{\phi}$

$\Phi = B\pi a^2 \quad = 0$ outside?

7.34)



$E = \frac{1}{\epsilon_0}\sigma$

$\frac{\partial E}{\partial t} = \frac{1}{\epsilon_0 A} I$

$J_d = \epsilon_0 \frac{\partial E}{\partial t}$

$J_d = \frac{I}{\pi a^2}$

$B\,2\pi s = \mu_0 I$

$B = \frac{\mu_0 I s^2}{2\pi a^2}\hat{\phi}$