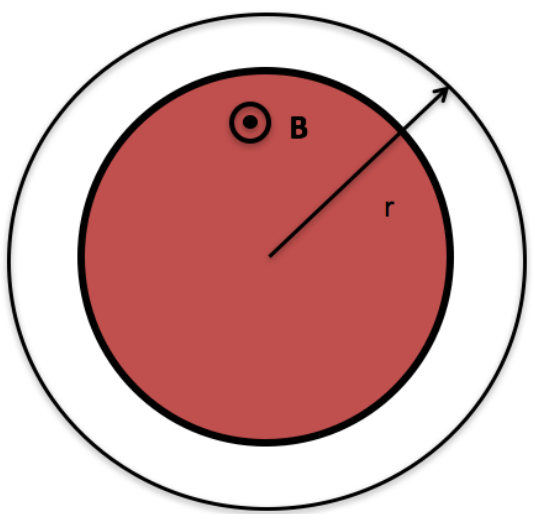
ANNOUNCEMENTS

- Quiz 2 - Next Friday (Motional EMF)
  - Discuss the differences between:
    - $\mathcal{E} = \oint \mathbf{f} \cdot d\mathbf{l}$ and $\mathcal{E} = -\frac{d\Phi_B}{dt}$
  - Solve a motional EMF problem and discuss the direction of the current

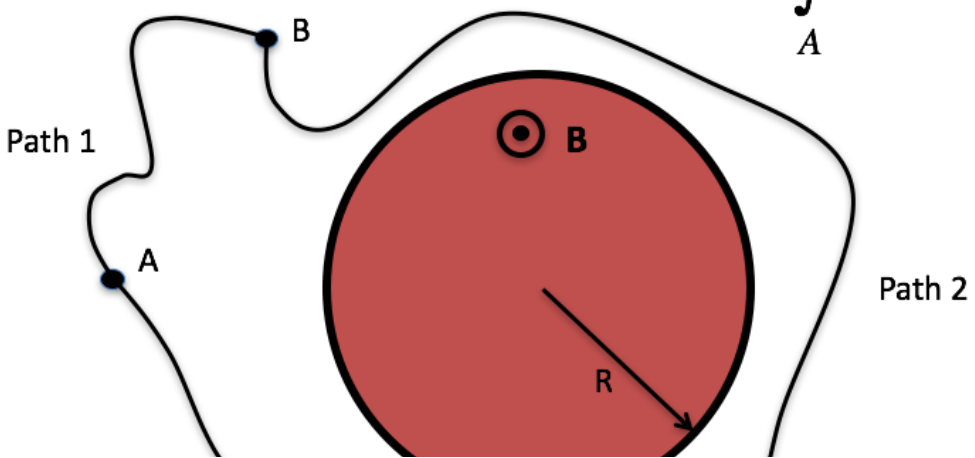
The current in an infinite solenoid with uniform magnetic field $\mathbf{B}$ inside is increasing so that the magnitude B is increasing with time as $B = B_0 + kt$. A circular loop of radius r is placed coaxially outside the solenoid as shown. In what direction is the induced $\mathbf{E}$ field around the loop?



A. CW
B. CCW
C. The induced E is zero
D. Not enough information

The current in an infinite solenoid of radius R with uniform magnetic field $\mathbf{B}$ inside is increasing so that the magnitude B in increasing with time as $B = B_0 + kt$. If I calculate V along path 1 and path 2 between points A and B, do I get the same answer?

$$V = -\int_A^B E \cdot dl$$



A. Yes
B. No
C. Need more information

A long solenoid of cross sectional area, A, creates a magnetic field, $B_0(t)$ that is spatially uniform inside and zero outside the solenoid. SO:

A. $E = \dfrac{\mu_0 I}{2\pi r}$

B. $E = -A\dfrac{\partial B}{\partial t}\dfrac{1}{\pi r^2}$

C. $E = -A2\pi r\dfrac{\partial B}{\partial t}$

D. $E = -A\dfrac{\partial B}{\partial t}\dfrac{1}{2\pi r}$

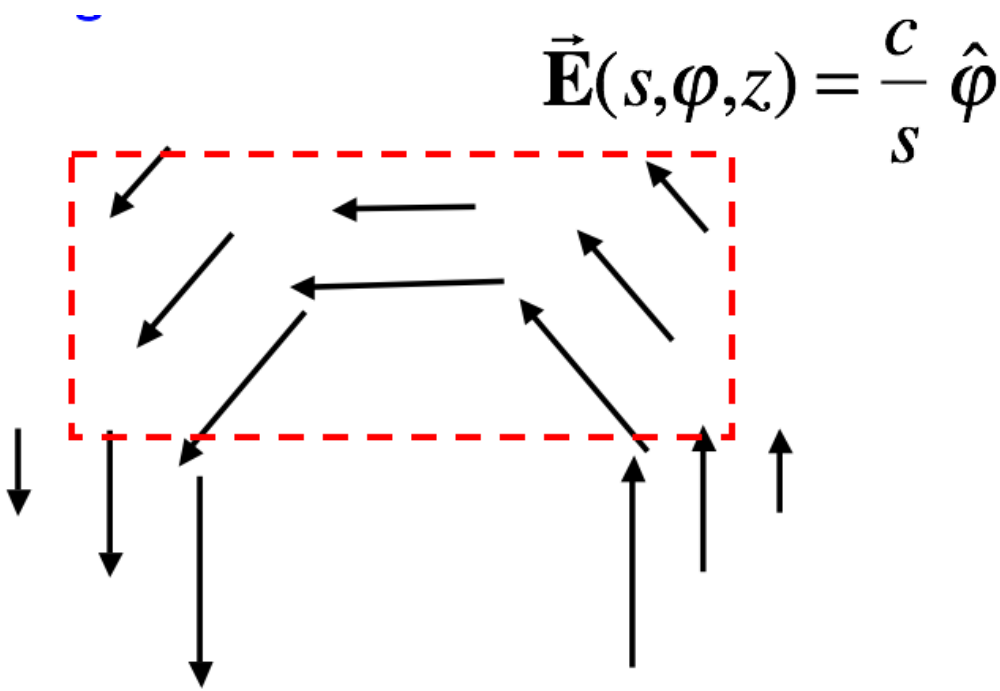
E. Something else

If the arrows represent an E field, is the rate of change in magnetic flux (perpendicular to the page) through the dashed region zero or nonzero?

A. $\frac{d\Phi}{dt} = 0$

B. $\frac{d\Phi}{dt} \neq 0$

C. ???



If the arrows represent an E field (note that |E| is the same everywhere), is the rate of change in magnetic flux (perpendicular to the page) in the dashed region zero or nonzero?

A. $\frac{d\Phi}{dt} = 0$

B. $\frac{d\Phi}{dt} \neq 0$

C. Need more information