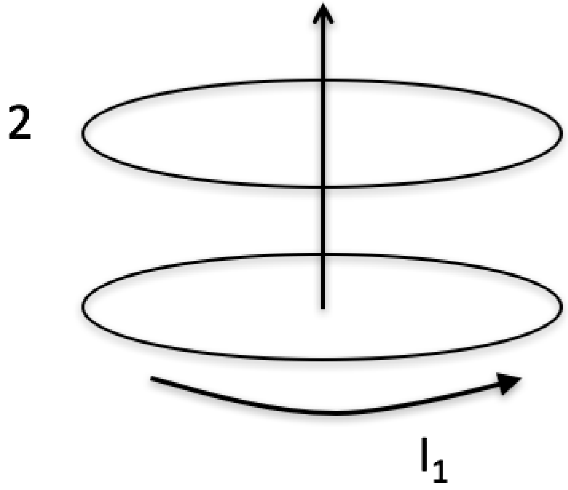
Somewhere in space a magnetic field is changing with time, there are no other sources of electric field field anywhere. In this case, can we define a potential difference between two points?

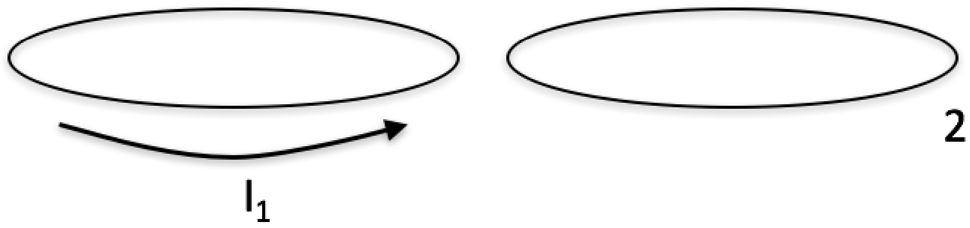
A. Yes, we can always do this
B. Yes, but only if we define the specific path as well
C. No, the story is more complicated than A or B.
D. No, whenever $\nabla \times E \neq 0$, the concept of potential breaks down
E. More than one of these

The current I_1 in loop 1 is increasing. What is the direction of the induced current in loop 2, which is co-axial with loop 1?



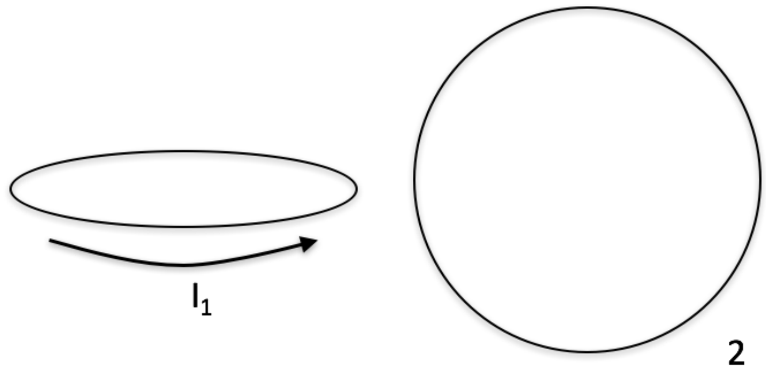
A. The same direction as I_1
B. The opposite direction as I_1
C. There is no induced current
D. Need more information

The current I_1 in loop 1 is increasing. What is the direction of the induced current in loop 2, which lies in the same plane as loop 1?



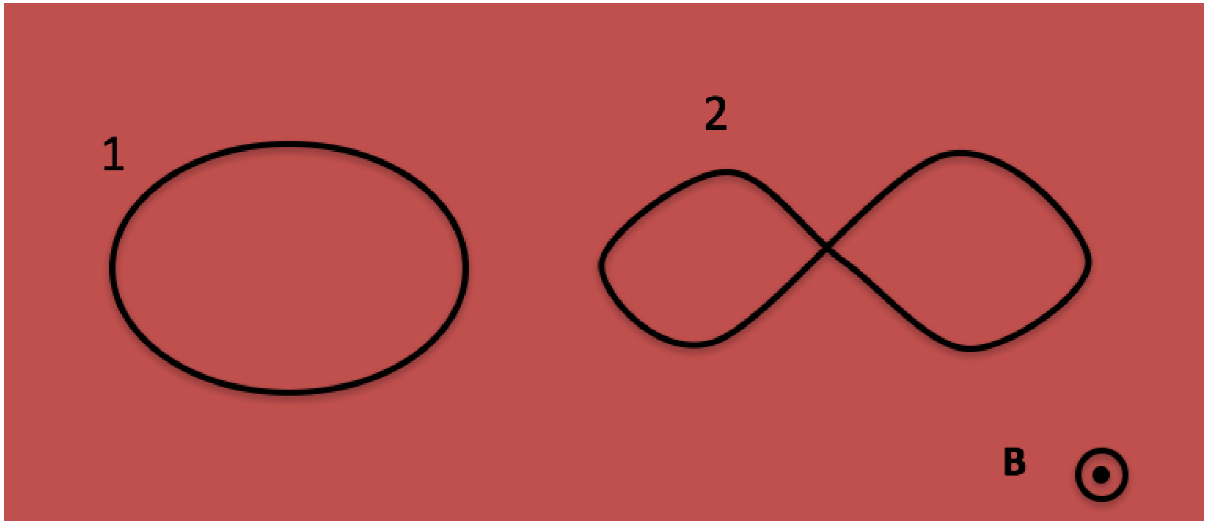
A. The same direction as I_1
B. The opposite direction as I_1
C. There is no induced current
D. Need more information

The current I_1 in loop 1 is decreasing. What is the direction of the induced current in loop 2, which lies in a plane perpendicular to loop 1 and contains the center of loop 1?



A. The same direction as I_1
B. The opposite direction as I_1
C. There is no induced current
D. Need more information

Two flat loops of equal area sit in a uniform field $\mathbf{B}$ which is increasing in magnitude. In which loop is the induced current the largest? (The two wires are insulated from each other at the crossover point in loop 2.)

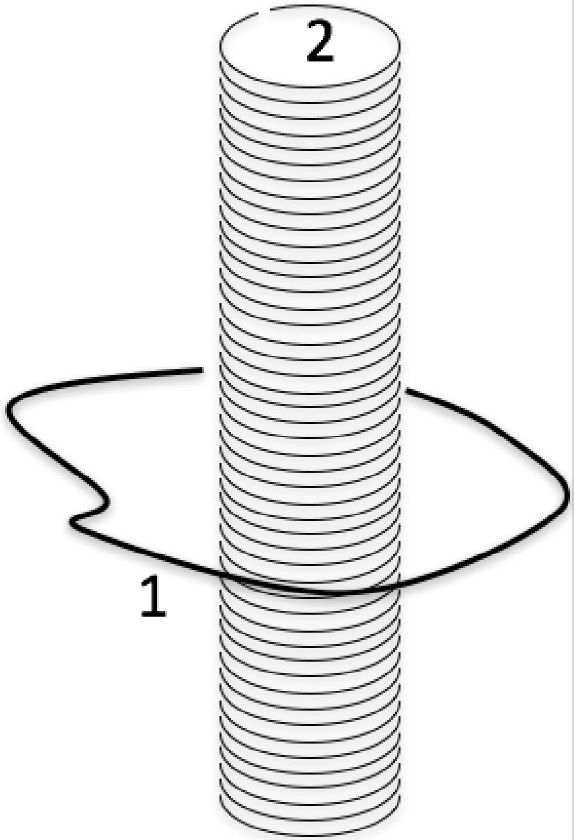


A. Loop 1
B. Loop 2
C. They are both the same
D. Not enough info

A loop of wire 1 is around a very long solenoid 2.

$\Phi_1 = M_{12} I_2$ = the flux through loop 1 due to the current in the solenoid

$\Phi_2 = M_{21} I_1$ = the flux through the solenoid due to the current in loop 1



Which is easier to compute?

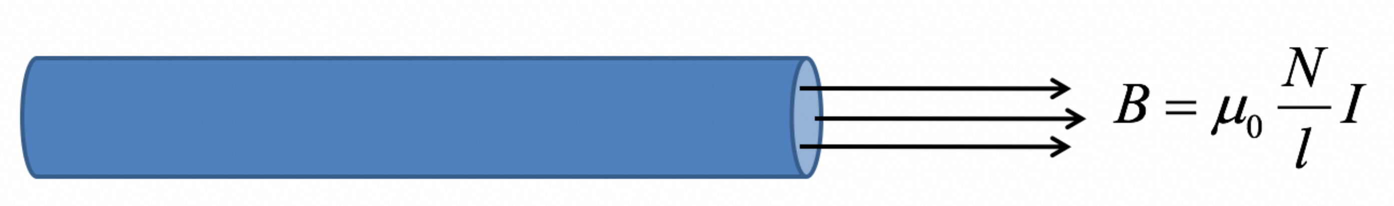
A. M_{12}
B. M_{21}
C. equally difficult to compute

A long solenoid of cross sectional area, A, length, l, and number of turns, N, carrying current, I, creates a magnetic field, B, that is spatially uniform inside and zero outside the solenoid. It is given by:

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{thru}$$

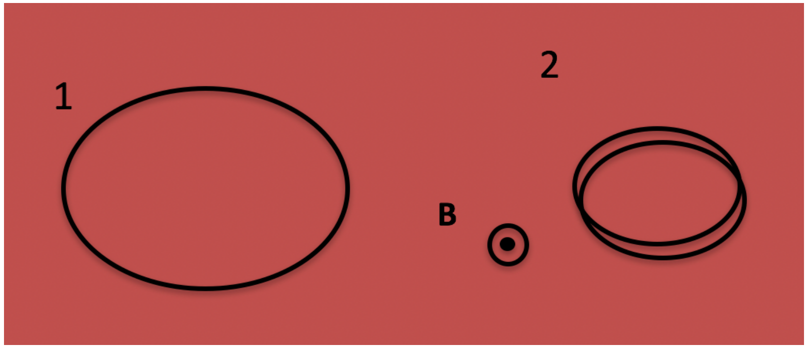
A. $B = \mu_0 N^2 / l$
B. $B = \mu_0 (N^2 / l) I$
C. $B = \mu_0 (N / l) I$
D. $B = \mu_0 (N^2 / l) A I$

A long solenoid of cross sectional area, A, length, l, and number of turns, N, carrying current, I, creates a magnetic field, B, that is spatially uniform inside and zero outside the solenoid. The self inductance is:



A. $L = \mu_0 N^2/(IA)$
B. $L = \mu_0 (N/l) A$
C. $L = \mu_0 (N^2/l^2) A$
D. $L = \mu_0 (N^2/l) A$

Loop 1 sits in a uniform field B which is increasing in magnitude. Loop 2 has the SAME LENGTH OF WIRE looped (coiled) to make two (smaller) loops. How do the induced EMFs compare?



A. EMF(1)=4 EMF(2)
B. EMF(1) = 2 EMF(2)
C. They are both the same.
D. EMF(2)= 4 EMF(1)
E. EMF(2) = 2 EMF(1)

The switch is closed at $t = 0$. What can you say about $I(t = 0+)$?

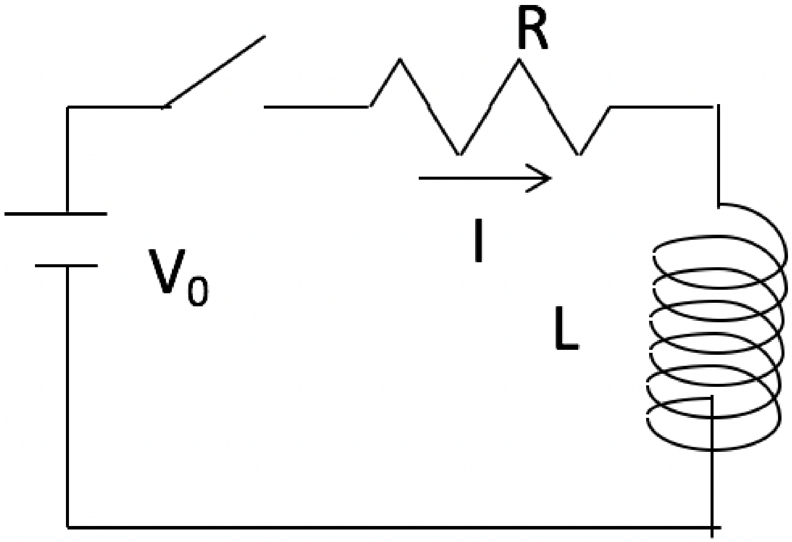
A. Zero

B. V_0/R

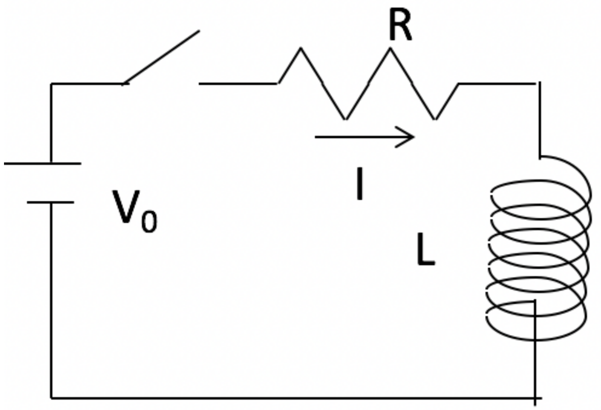
C. V_0/L

D. Something else!

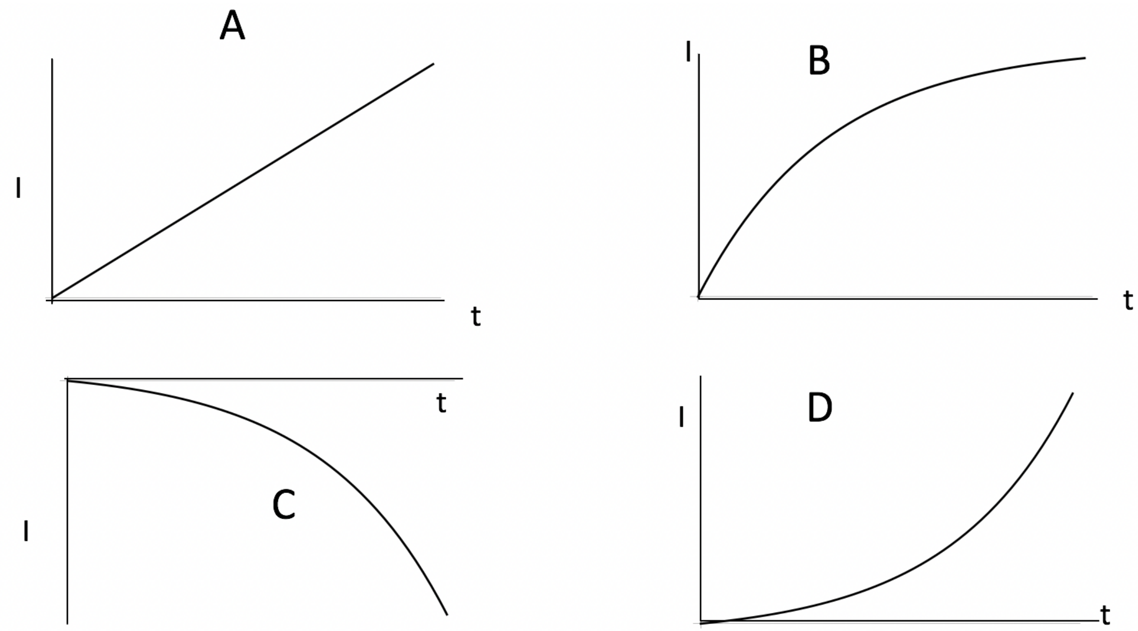
E. ???



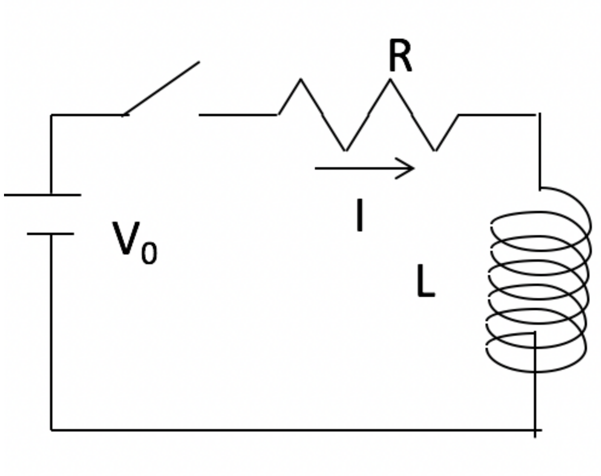
The switch is closed at $t = 0$. Which graph best shows $I(t)$?



E) None of these (they all have a serious error!)



The switch is closed at $t = 0$. What can you say about the magnitude of ΔV(across the inductor) at $(t = 0+)$?



A. Zero

B. V_0

C. L

D. Something else!

E. ???

For the RL circuit with driving voltage of $V(t) = V_0 \cos(\omega t)$, we found a solution for the current as a function of time, with $I = 0$ at $t = 0$,

$$I(t) = a\cos(\omega t + \phi) - a\cos(\phi)e^{-Rt/L}$$

where $a = \frac{V_0}{\sqrt{R^2+L^2\omega^2}}$ and $\phi = \tan^{-1}(-L\omega/R)$. What happens to the current when $\omega \to 0$?

A. Current is essentially zero, for all time
B. Current dies off completely, eventually goes to zero
C. Eventually, current is constant, V_0/R
D. It depends
E. ???

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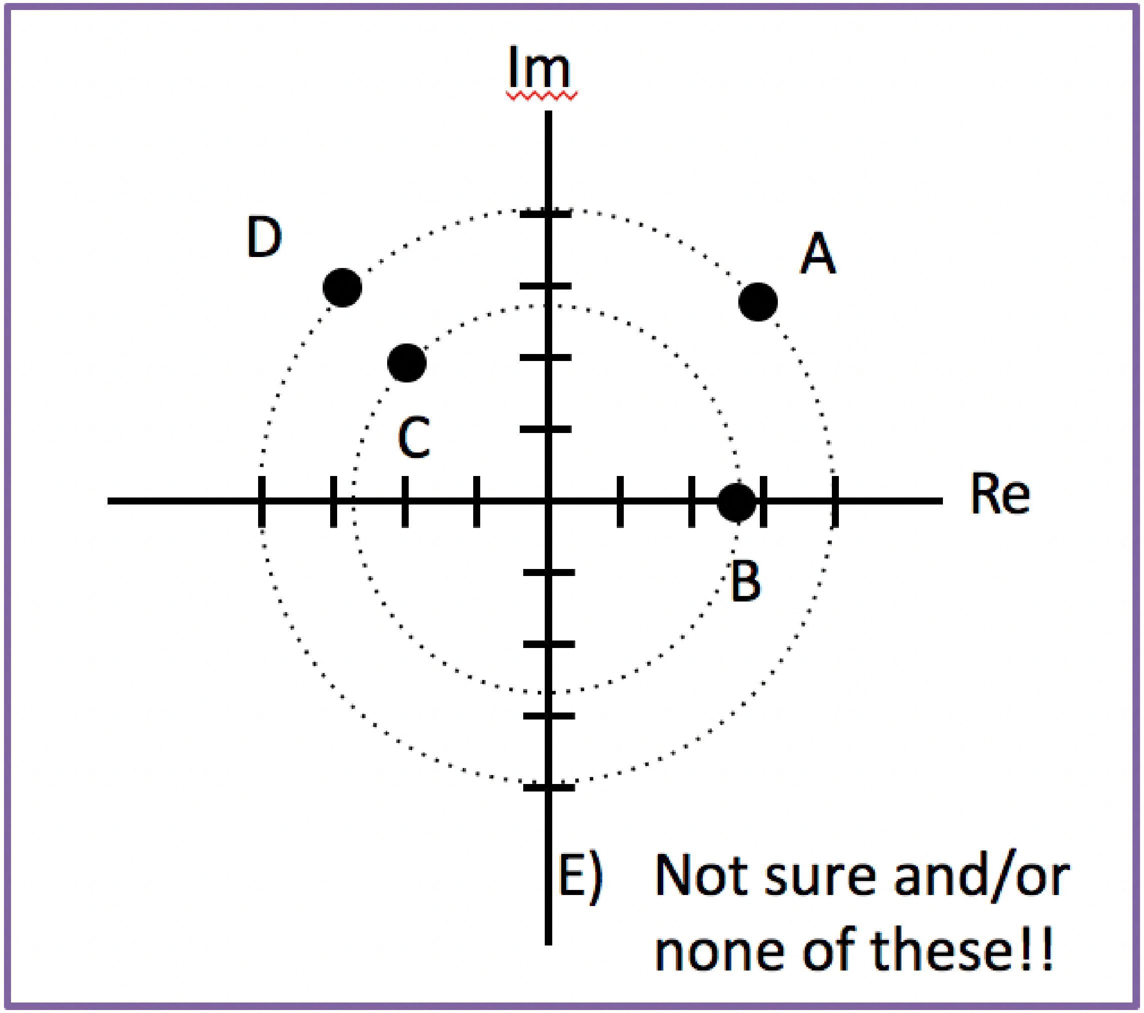
A. Current is essentially zero, for all time
B. Current dies off completely, eventually goes to zero
C. Eventually, current is constant, V_0/R
D. It depends
E. ???

Which point below best represents $4e^{i3\pi/4}$ on the complex plane?



What is the total impedance of this circuit, Z_{total}?

A. $R + i\left(\omega L + \frac{1}{\omega C}\right)$

B. $R + i\left(\omega L - \frac{1}{\omega C}\right)$

C. $\frac{1}{R} + \frac{1}{i\omega L} + i\omega C$

D. $\dfrac{1}{\frac{1}{R} + \frac{1}{i\omega L} + i\omega C}$

E. None of these