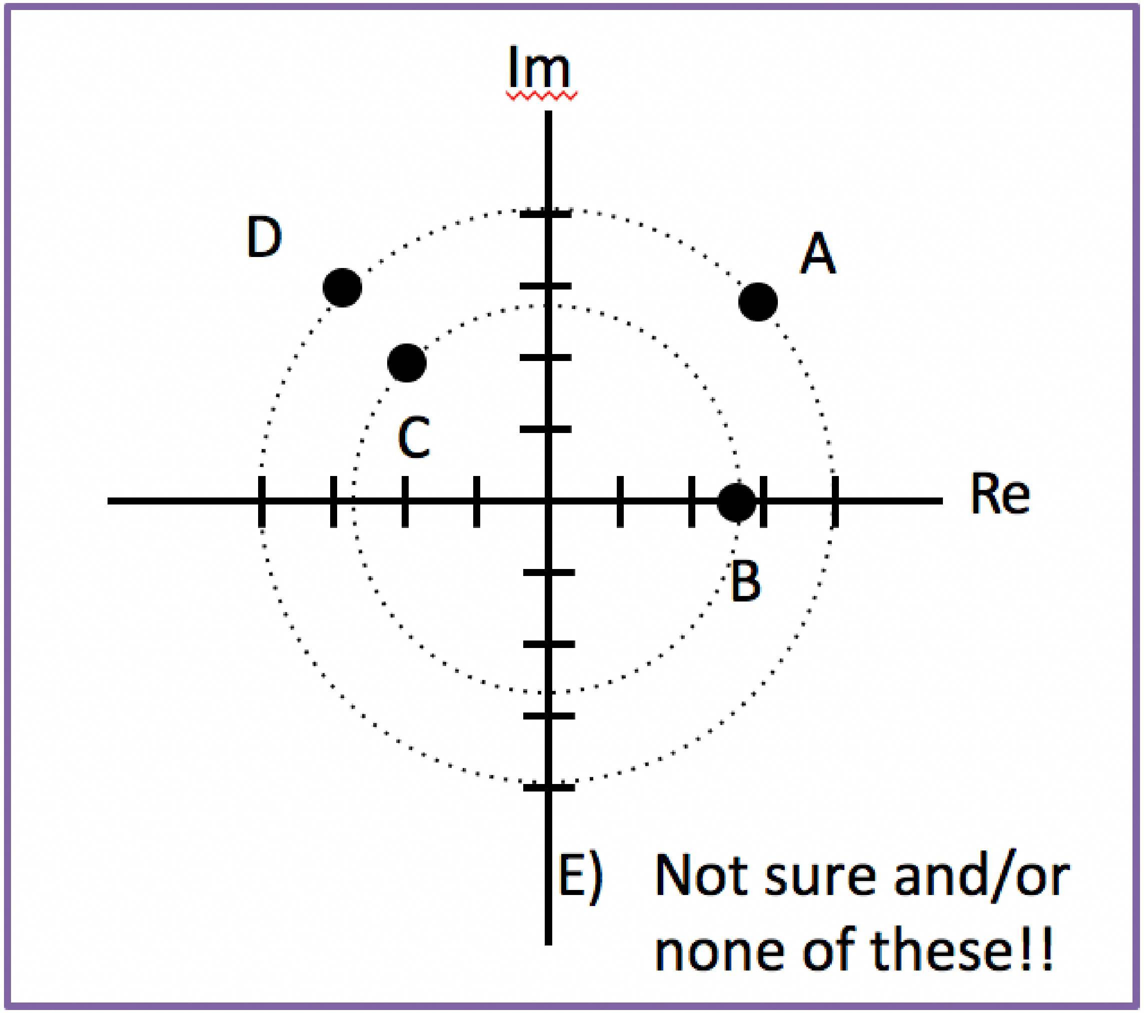
Which point below best represents $4e^{i3\pi/4}$ on the complex plane?



ANNOUNCEMENTS

- Quiz 3 (next Friday 2/22) - RLC circuits
  - Solve a circuit problem using the phasor method
  - Discuss limits on the response and how it might act as a filter

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

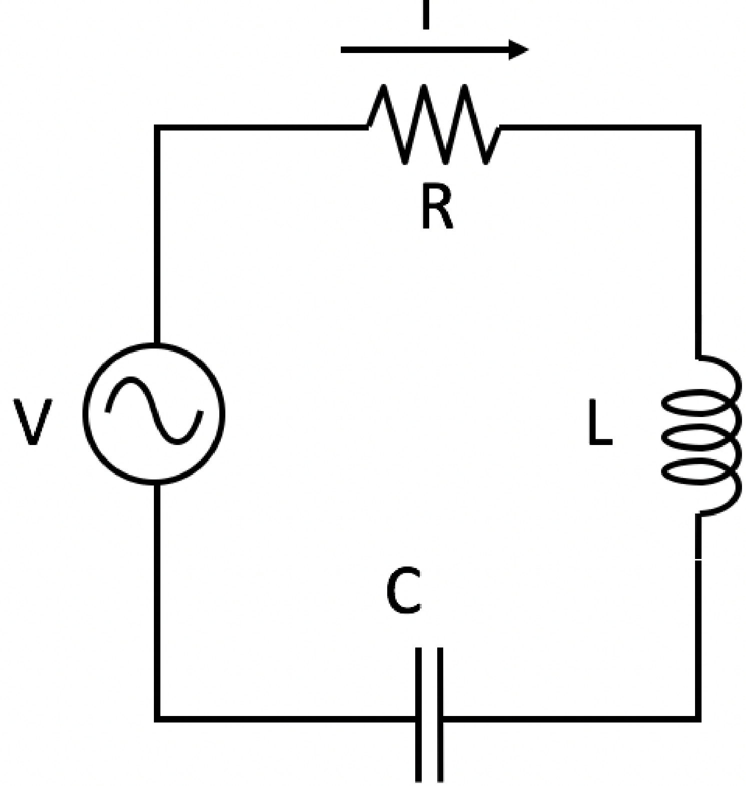
A. $R + i\left(\omega L + \frac{1}{\omega C}\right)$

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

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

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

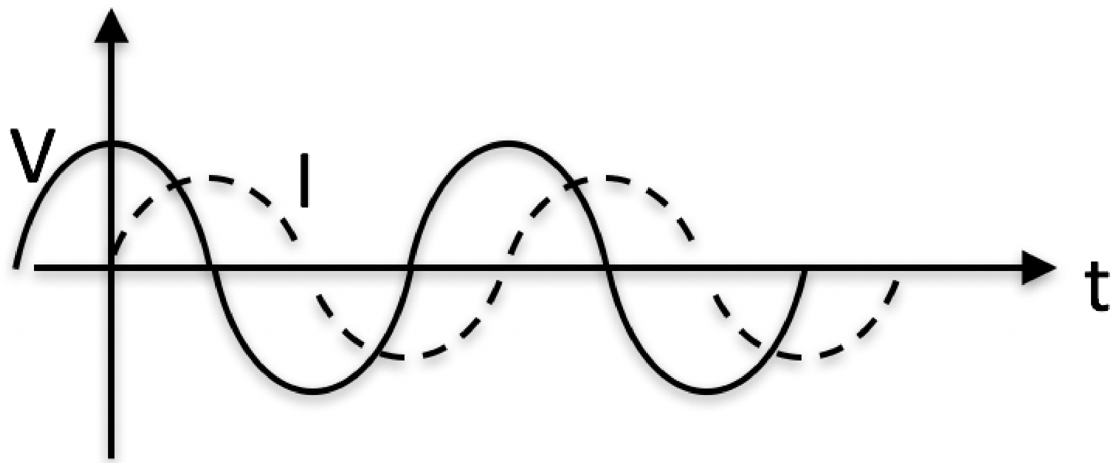
E. None of these



What is $Re\left[\frac{e^{i\omega t}}{1+i}\right]$?

A. $\frac{1}{\sqrt{2}}\cos(\omega t + \pi/4)$
B. $\frac{1}{\sqrt{2}}\cos(\omega t - \pi/4)$
C. $\frac{1}{2}\cos(\omega t + \pi/4)$
D. $\frac{1}{2}\cos(\omega t - \pi/4)$
E. Something else

AC voltage V and current I vs time t are as shown:



The graph shows that..

A. I leads V (I peaks before V peaks)
B. I lags V (I peaks after V peaks)
C. Neither

Suppose you have a circuit driven by a voltage:

$$V(t) = V_0 \cos(\omega t)$$

You observe the resulting current is:

$$I(t) = I_0 \cos(\omega t - \pi/4)$$

Would you say the current is

A. leading
B. lagging

the voltage by 45 degrees?

Consider an RC circuit attached to a sinusoidally driven voltage source. If at $t = 0$ we turn on the source, $I(t=0) = \frac{V_0}{R}$. Then the current follows this solution,

$$I(t) = \frac{V_0}{\sqrt{R^2 + \frac{1}{\omega^2 C^2}}} \cos(\omega t + \phi) - \left(\frac{V_0}{R} - \frac{V_0 \cos \phi}{\sqrt{R^2 + \frac{1}{\omega^2 C^2}}} \right)$$

What happens to the long term current as $\omega \to 0$?

A. goes to zero

B. goes to $\dfrac{V_0}{R}$

C. goes to infinity

D. Something else

Consider an RC circuit attached to a sinusoidally driven voltage source. If at $t = 0$ we turn on the source, $I(t=0) = \frac{V_0}{R}$. Then the current follows this solution,

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What happens to the long term current as $\omega \to \infty$?

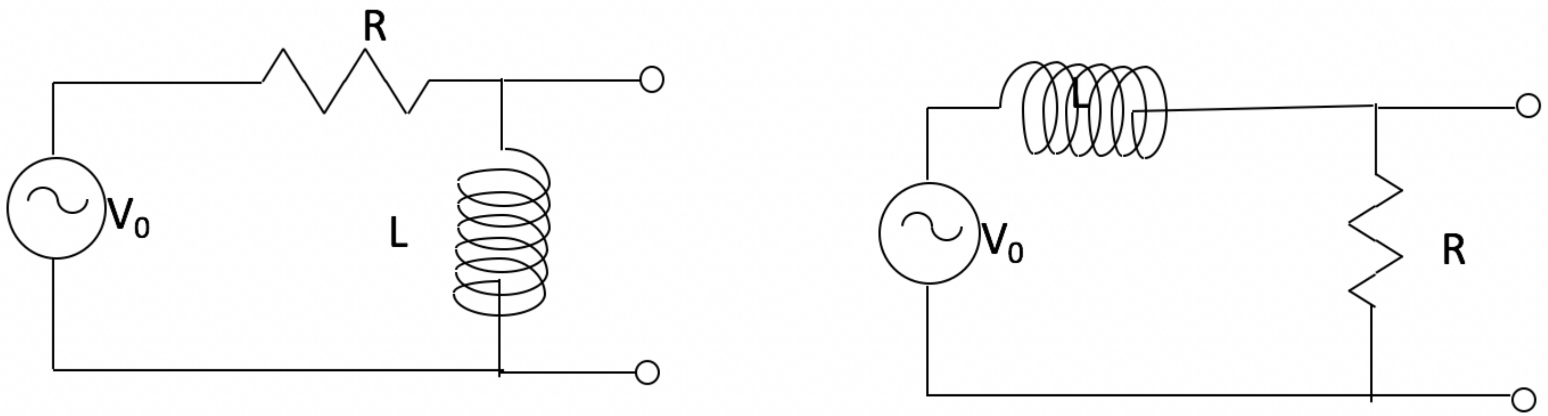
A. goes to zero

B. goes to $\dfrac{V_0}{R}$

C. goes to infinity

D. Something else

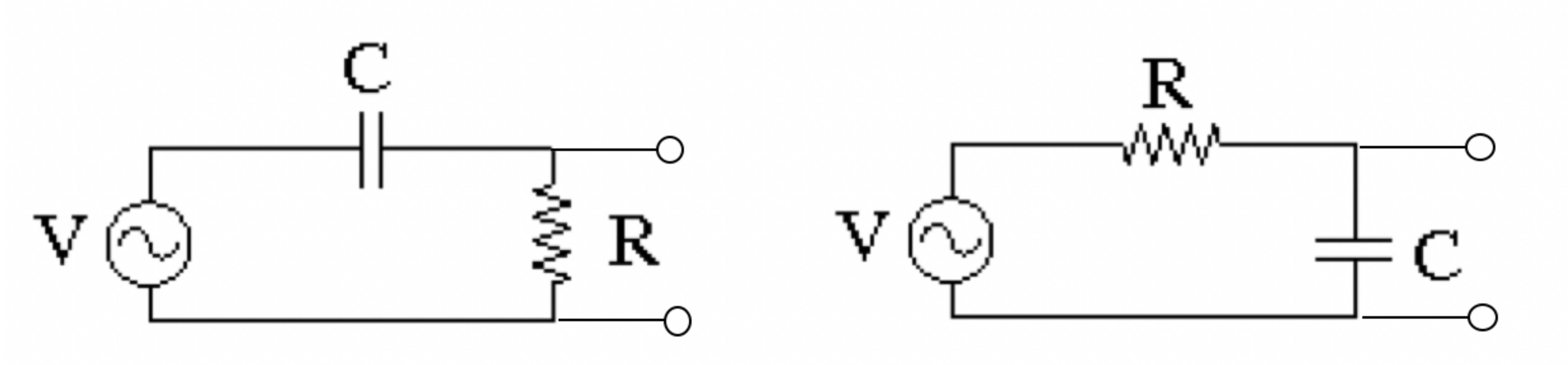
Two LR circuits driven by an AC power supply are shown below.



Which circuit is a low pass filter?

A. The left circuit
B. The right circuit
C. Both circuits
D. Neither circuit

Two RC circuits driven by an AC power supply are shown below.



Which circuit is a high pass filter?

A. The left circuit
B. The right circuit
C. Both circuits
D. Neither circuit