

Which of the following are vectors?

(I) Electric field, (II) Electric flux, and/or (III) Electric charge

A. I only

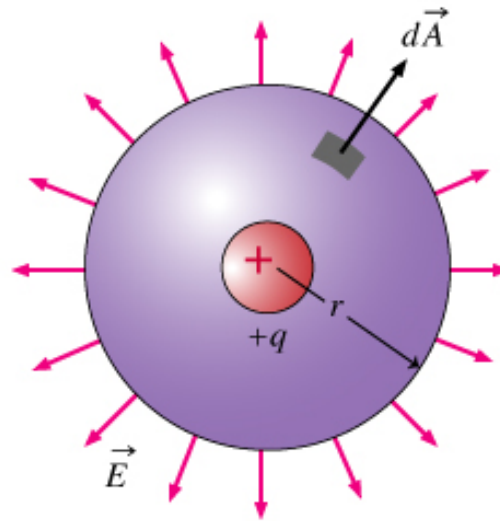
B. I and II only

C. I and III only

D. II and III only

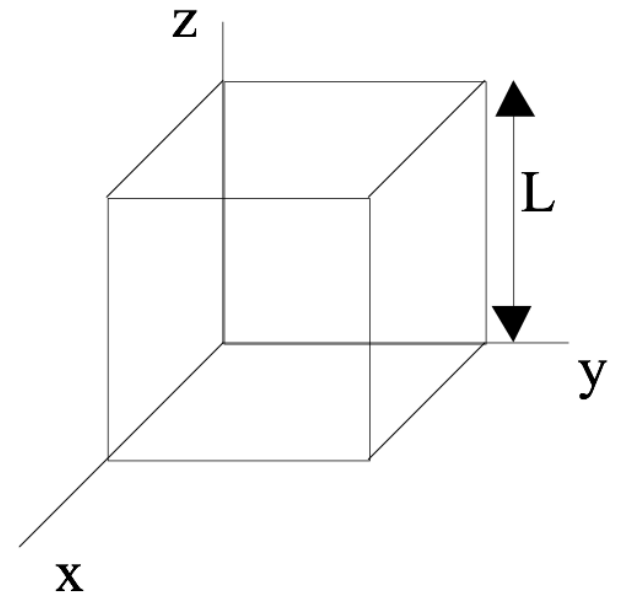
E. I, II, and III

GAUSS' LAW



$$\oint_S \mathbf{E} \cdot d\mathbf{A} = \int_V \frac{\rho}{\epsilon_0} d\tau$$

The space in and around a cubical box (edge length L) is filled with a constant uniform electric field, $\mathbf{E} = E_0 \hat{y}$. What is the TOTAL electric flux $\oint_S \mathbf{E} \cdot d\mathbf{A}$ through this closed surface?



- A. 0
- B. $E_0 L^2$
- C. $2E_0 L^2$
- D. $6E_0 L^2$
- E. We don't know $\rho(r)$, so can't answer.

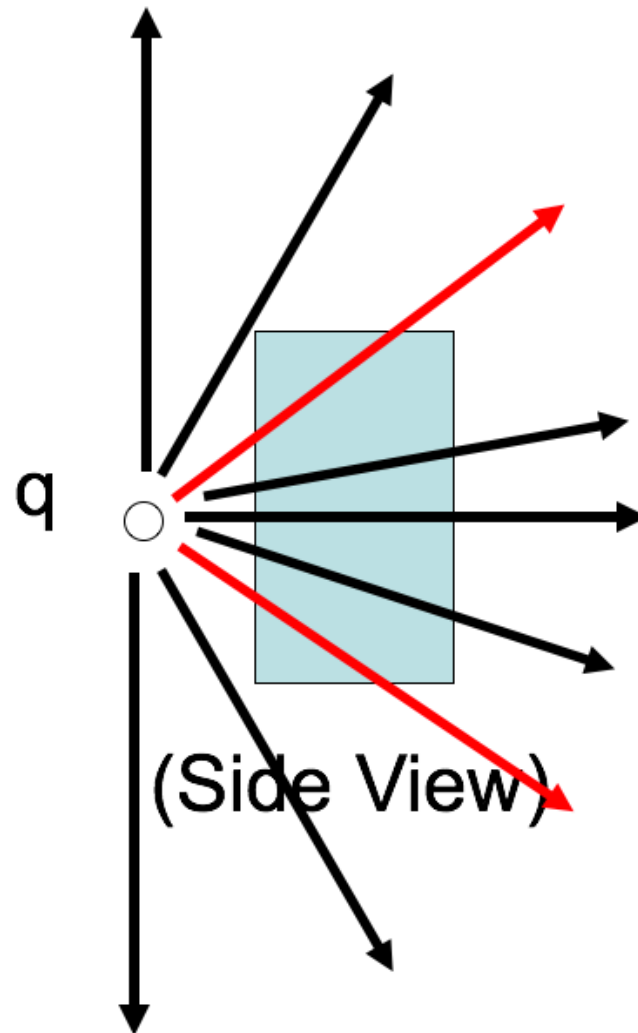
A positive point charge $+q$ is placed outside a closed cylindrical surface as shown. The closed surface consists of the flat end caps (labeled A and B) and the curved side surface (C). What is the sign of the electric flux through surface C?



- A. positive
- B. negative
- C. zero

D. not enough information given to decide

Let's get a better look at the side view.



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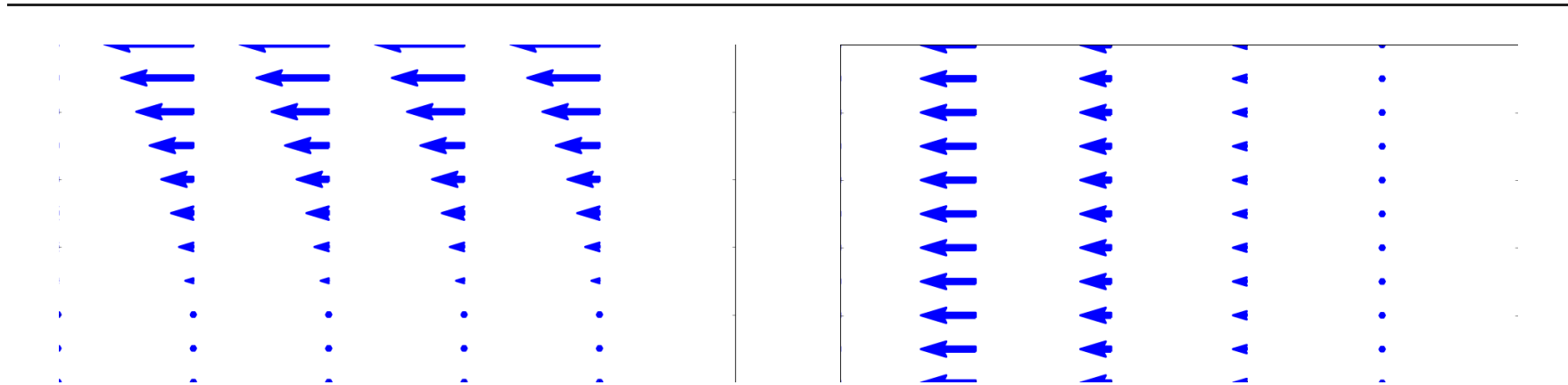
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- B. negative
- C. zero

D. not enough information given to decide

Which of the following two fields has zero divergence?

I

II



- A. Both do.
- B. Only I is zero
- C. Only II is zero
- D. Neither is zero
- E. ???

What is the divergence in the boxed region?

- A. Zero
- B. Not zero
- C. ???

