Activity:

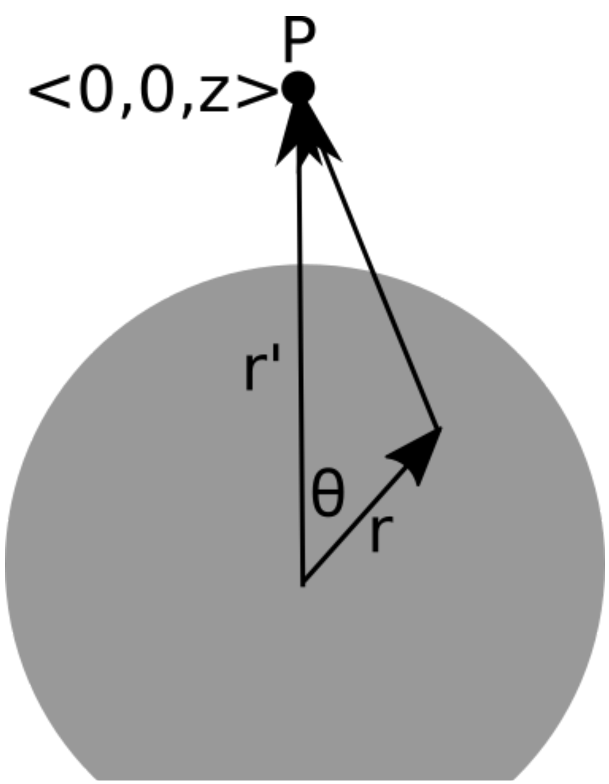
You determine that a particular electrostatics problem cannot be integrated analytically. How do you instruct a computer to do it for you?

Work with those around you to come up with a series of instructions (in plain words) to tell the computer to do it.

ANNOUNCEMENTS

- Will start "counting" clickers next Monday
  - Register your clicker!
- If you need help with Python, let me know ASAP!
- Honors Option
  - Talk to me about your ideas
  - Option 1: Design a computational activity for this class
  - Option 2: Develop a computational model and paper for an interesting electrostatics phenomenon
  - Option 3: Pitch me your idea

Given the location of the little bit of charge (dq), what is $|\vec{\mathfrak{R}}|$?



A. $\sqrt{z^2 + r'^2}$

B. $\sqrt{z^2 + r'^2 - 2zr' \cos\theta}$

C. $\sqrt{z^2 + r'^2 + 2zr' \cos\theta}$

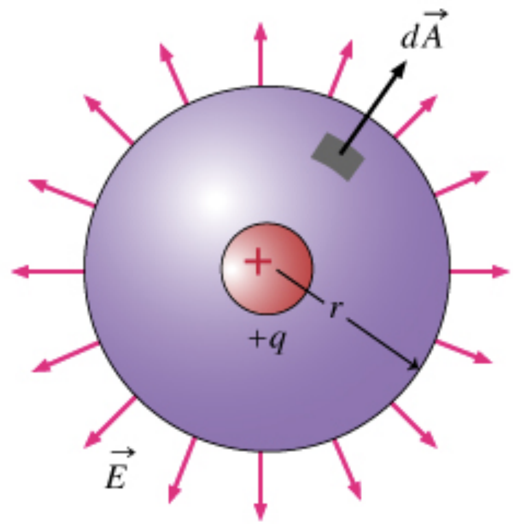
D. Something else

Which of the following are vectors?

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

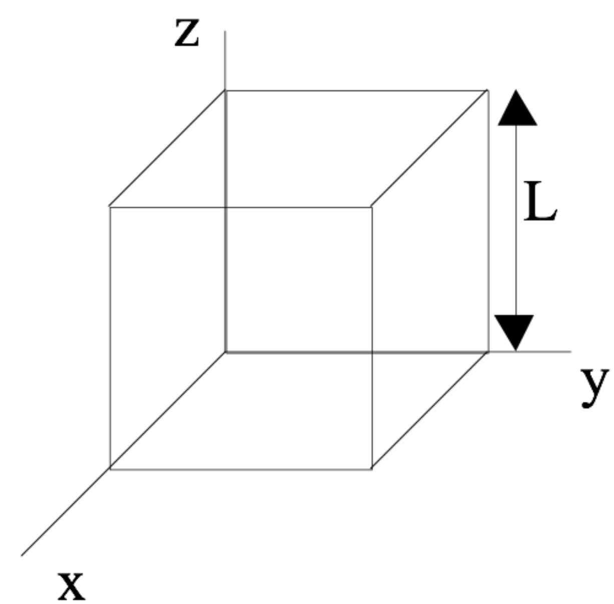
A. I only
B. I and II only
C. I and III only
D. II and III only
E. I, II, and II

GAUSS' LAW



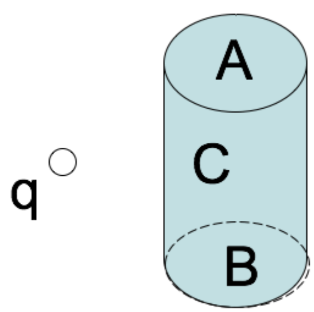
$$\oint_S \mathbf{E} \cdot d\mathbf{A} = \int_V \frac{\rho}{\varepsilon_0} d\tau$$

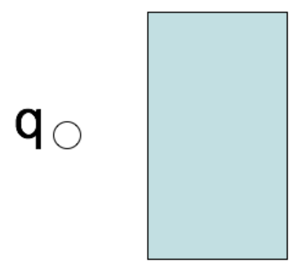
The space in and around a cubical box (edge length L) is filled with a constant uniform electric field, $\mathbf{E} = E_0\hat{y}$. What is the TOTAL electric flux $\oint_S \mathbf{E}\cdot d\mathbf{A}$ through this closed surface?



A. 0
B. E_0L^2
C. $2E_0L^2$
D. $6E_0L^2$
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?





(Side View)

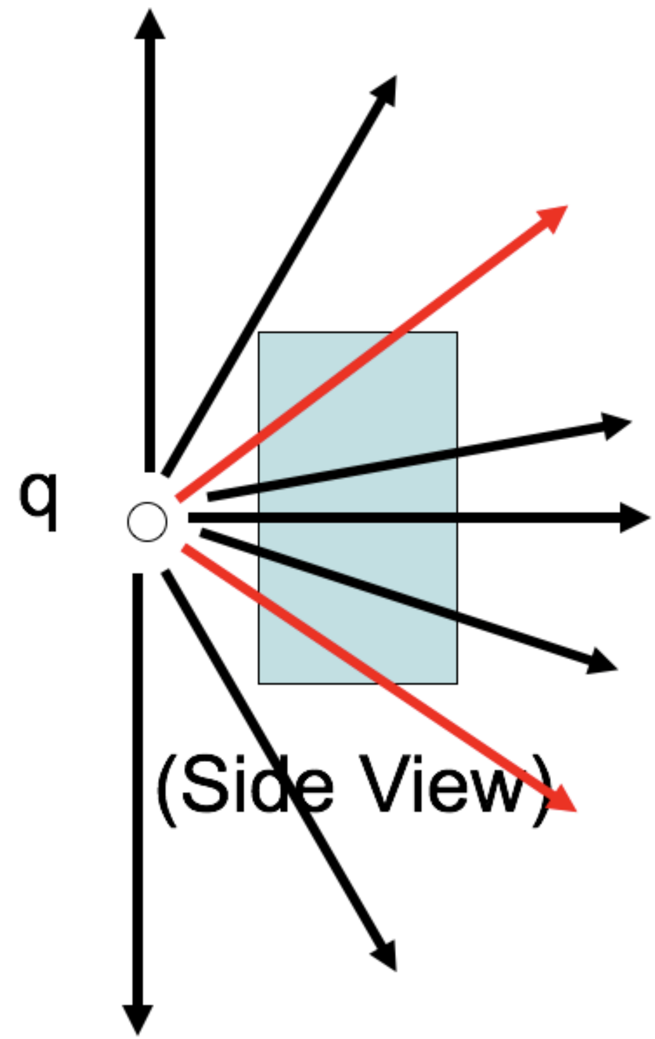
A. positive

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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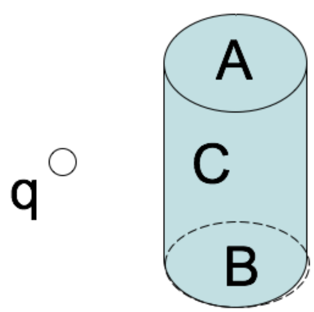

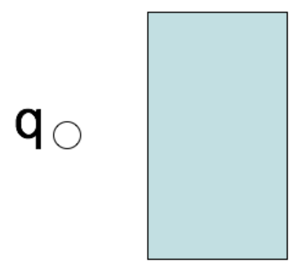

(Side View)

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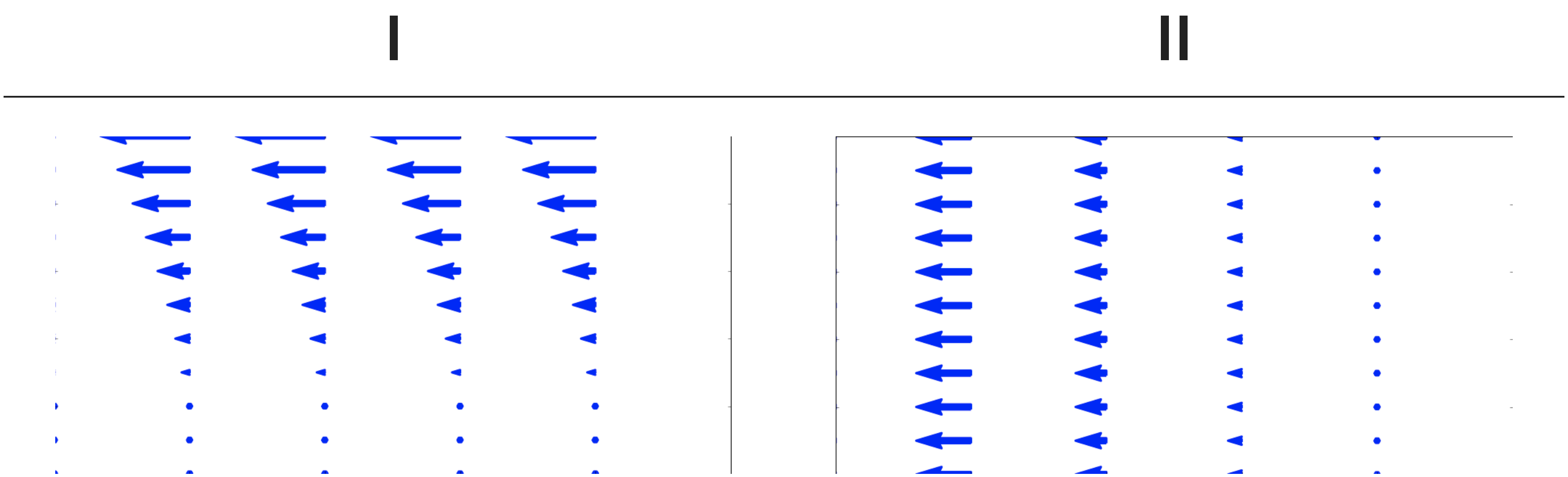
Which of the following two fields has zero divergence?



A. Both do.

B. Only I is zero

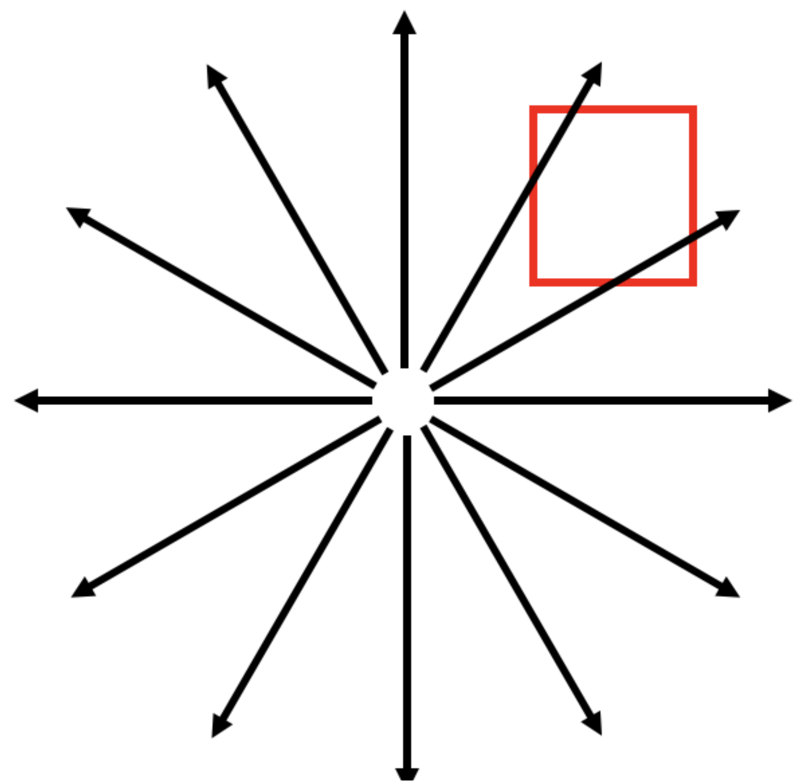
C. Only II is zero

D. Neither is zero

E. ???

What is the divergence in the boxed region?

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



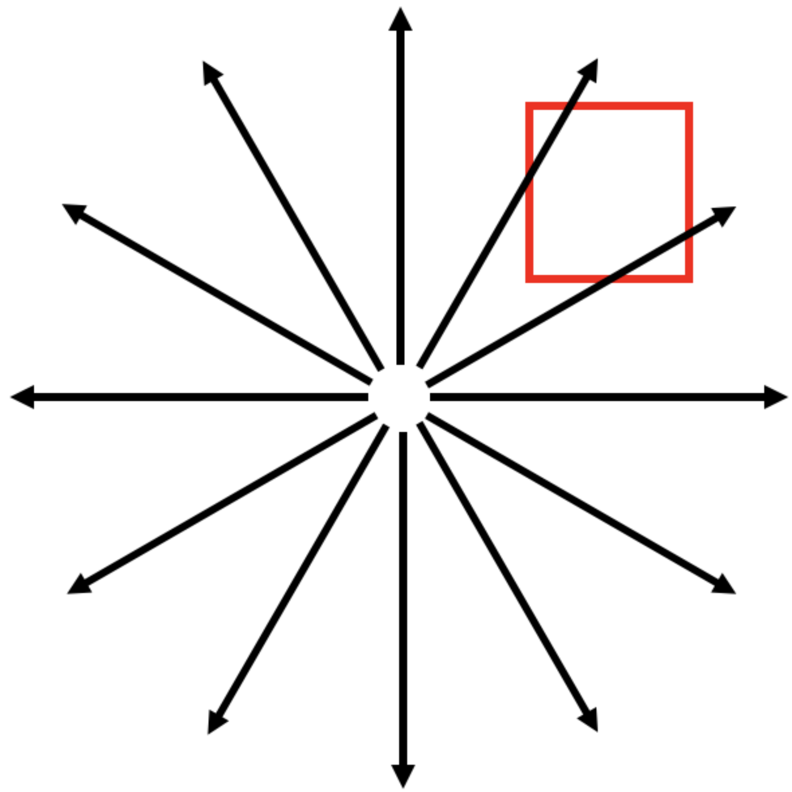
Activity: For a the electric field of a point charge,

$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}, \text{ compute } \nabla \cdot \mathbf{E}.$$

Hint: The front fly leaf of Griffiths suggests that the we take:

$$\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2 E_r\right)$$

Remember this?



What is the value of:

$$\int_{-\infty}^{\infty} x^2 \delta(x-2) dx$$

A. 0
B. 2
C. 4
D. ∞
E. Something else

Activity: Compute the following integrals. Note anything special you had to do.

- Row 1-2: $\int_{-\infty}^{\infty} xe^x \delta(x-1)dx$
- Row 3-4: $\int_{\infty}^{-\infty} \log(x)\delta(x-2)dx$
- Row 5-6: $\int_{-\infty}^{0} xe^x \delta(x-1)dx$
- Row 6+: $\int_{-\infty}^{\infty} (x+1)^2 \delta(4x)dx$