WELCOME TO PHY 482

ELECTRODYNAMICS

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IMPORTANT SITES

- Course Webpage: http://dannycab.github.io/phy482msu_s2020/
- Slack Team: https://phy482msuspring2020.slack.com/

COURSE ACTIVITIES

- Projects:
  - 2 of them; Feb 28 & Apr 28 - 20% each
- In-Class Quizzes:
  - 7 of them; Every other Friday; 1 dropped - 20%
- Homework:
  - 14 of them; Due on Fridays by 5pm; 1 dropped - 40%
- Clickers:
  - Participation; no credit

Much more detail on website

Learning is a social and collaborative act!

HOMEWORK HELP SESSION

Evening session once per week (Location TBD)

Question to you: When should we do this?

Reminder: Homework is due on Fridays (expect this first one).

THIS WEEK!!!

- Homework 1 is already up (Due Fri. Jan. 10 at 5pm)
- Read (seriously do this!)
  - Griffiths Ch 7.1.1-7.1.2 (Review? Chs 1-6)
- Download Anaconda distribution of Python

Stay up-to-date by checking website, calendar, and discussion forum regularly.

COMPUTATIONAL HOMEWORK PROBLEMS

- We will be using Python on homework problems this semester.
- Homework solutions should take the form of a Jupyter notebook, which you will upload using GitHub.
- If you get stuck somewhere, post on Slack, so your classmates benefit from your question.

PROJECTS

INDIVIDUAL PROJECT (MAR. 1)

- Literature review of some interesting topic in E&M (4-5 pages)
- Homework questions will support you on this
  - See syllabus for sample questions
- Paper should be typed, inline references, bibliography, etc.
- Evaluation rubric is online

PROJECTS

PAIR PROJECT (APR 29)

- Poster presentation of an original contribution (theory and computation)
- Homework questions will support you on this
  - See syllabus for sample questions
- Can be something that has been done before that you just extend
- Evaluation rubric is online
- There will be a significant self-evaluation component to this also

QUESTIONS?

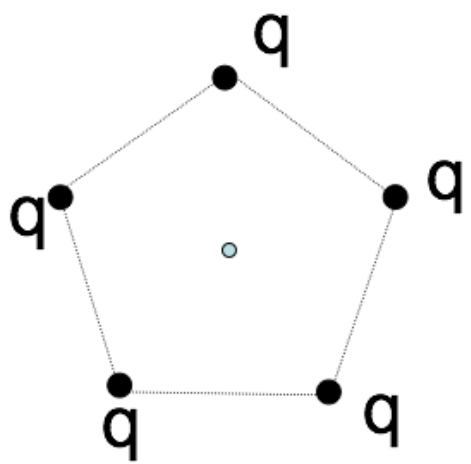
WHAT DO YOU THINK PHY 482 IS ABOUT?

ELECTROMAGNETISM IS THE FOUNDATIONAL FIELD THEORY OF PHYSICS

Think about everything you already know about electromagnetism (it's a lot already!).

Work with a partner to map out the electromagnetism concepts that you know and how they are related to each other.

5 charges, q, are arranged in a regular pentagon, as shown. What is the E field at the center?

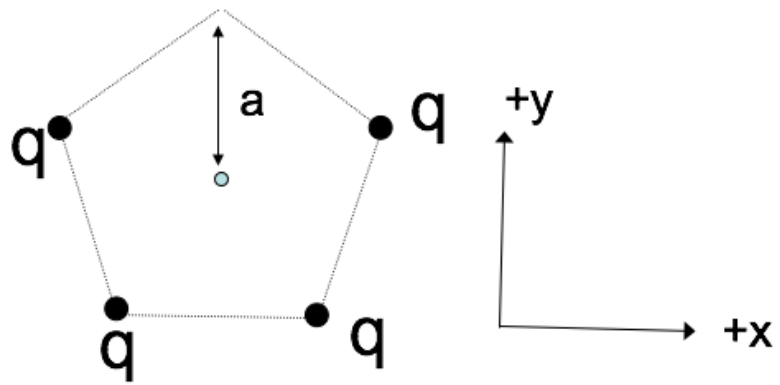


A. Zero

B. Non-zero

C. Really need trig and a calculator to decide

1 of the 5 charges has been removed, as shown.
What's the E field at the center?



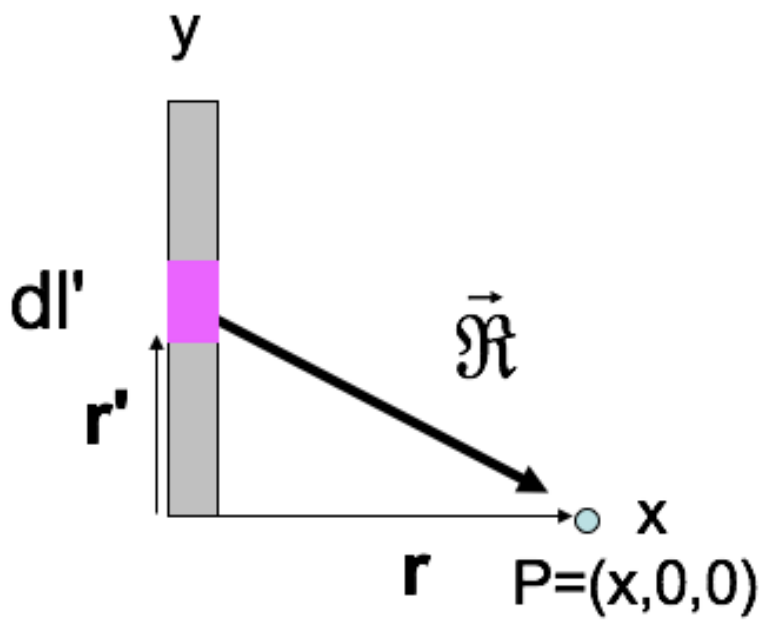
A. $+(kq/a^2)\hat{y}$
B. $-(kq/a^2)\hat{y}$
C. 0
D. Something entirely different!
E. This is a nasty problem which I need more time to solve

To find the E-field at P from a thin line (uniform charge density λ):

$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\varepsilon_0}\int \frac{\lambda dl'}{\mathfrak{R}^2}\hat{\mathfrak{R}}$$

What is $\mathfrak{R}$?

A. x
B. y'
C. $\sqrt{dl'^2 + x^2}$
D. $\sqrt{x^2 + y'^2}$
E. Something else

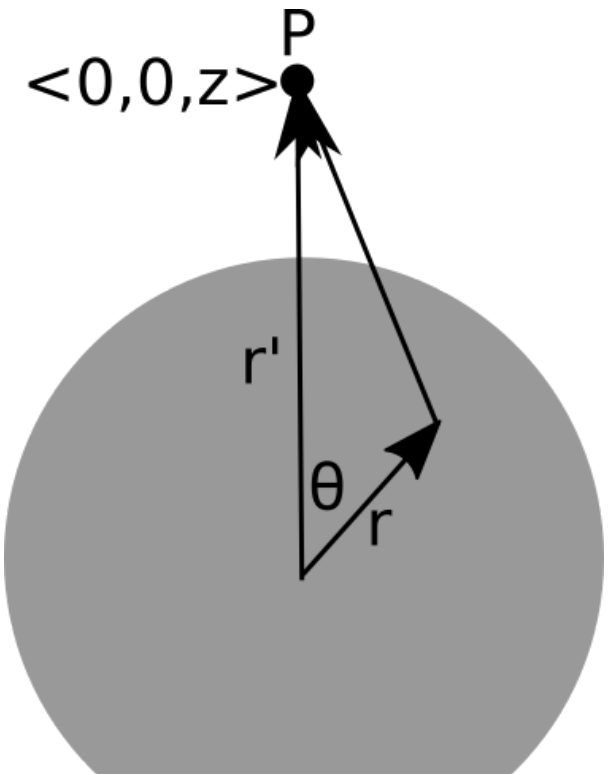


What do you expect to happen to the field as you get really far from the rod?

$$E_x = \frac{\lambda}{4\pi\varepsilon_0}\frac{L}{x\sqrt{x^2+L^2}}$$

A. E_x goes to 0.
B. E_x begins to look like a point charge.
C. E_x goes to ∞.
D. More than one of these is true.
E. I can't tell what should happen to E_x.

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

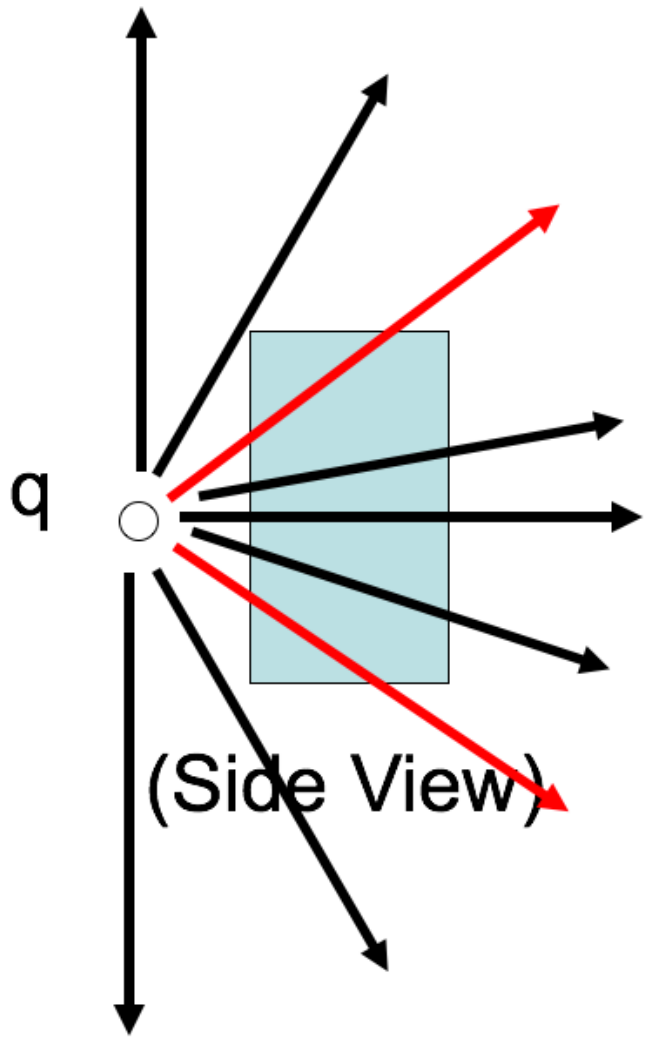
A. I only
B. I and II only
C. I and III only
D. II and III only
E. I, II, and II

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

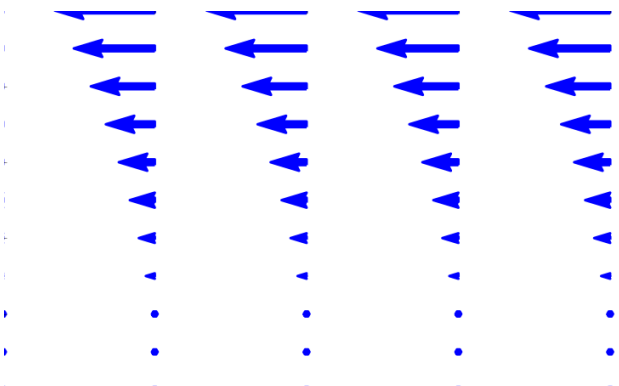
D. not enough information given to decide

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

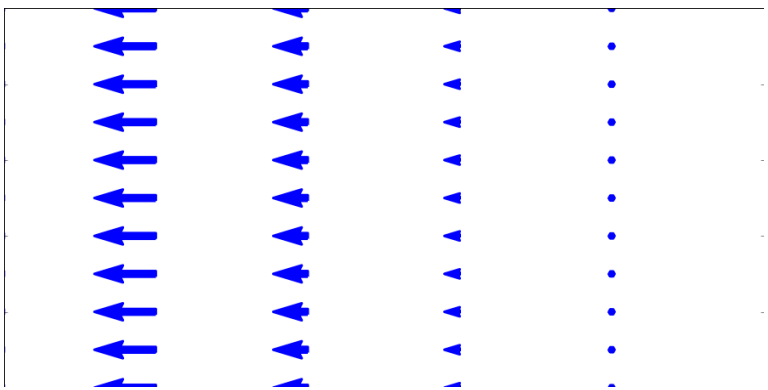


Which of the following two fields has zero divergence?

I



II



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