

WELCOME TO PHY 482

ELECTRODYNAMICS

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IMPORTANT SITES

- Course Webpage: dannycab.github.io/phy482msu_s2019/
- Discord Group: discord.gg/FcktcXz

COURSE ACTIVITIES

- Projects:
 - 2 of them; Mar 1 & Apr 29 - 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:
 - Pure Extra Credit - up to 2% bonus

[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. 11 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.
- Installation instructions appear on the piazza site.
- Homework solutions should take the form of a Jupyter notebook, which you can print to PDF and turn in.
- If you get stuck somewhere, post on Discord, 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?

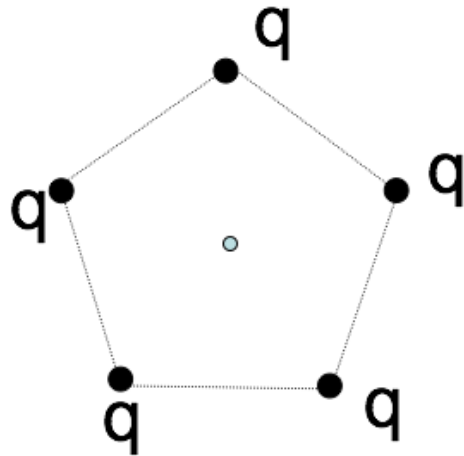
**WHAT DO YOU THINK PHY 482 IS
ABOUT?**

ELECTROMAGNETISM IS THE FOUNDATIONAL FIELD THEORY OF PHYSICS

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

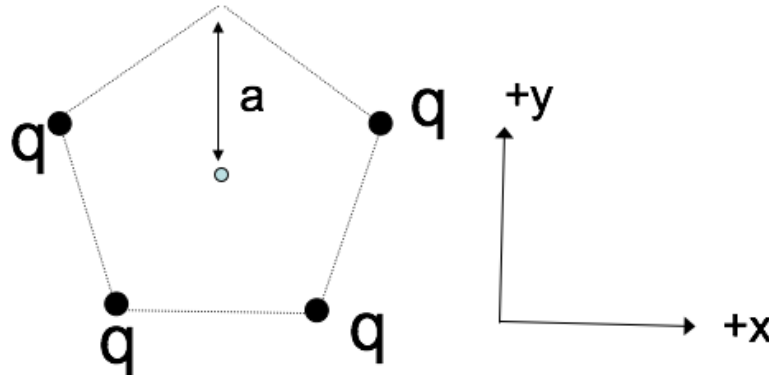
Work with a partner to map out the electromagnetism concepts that you know and how they are related to each other.

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?



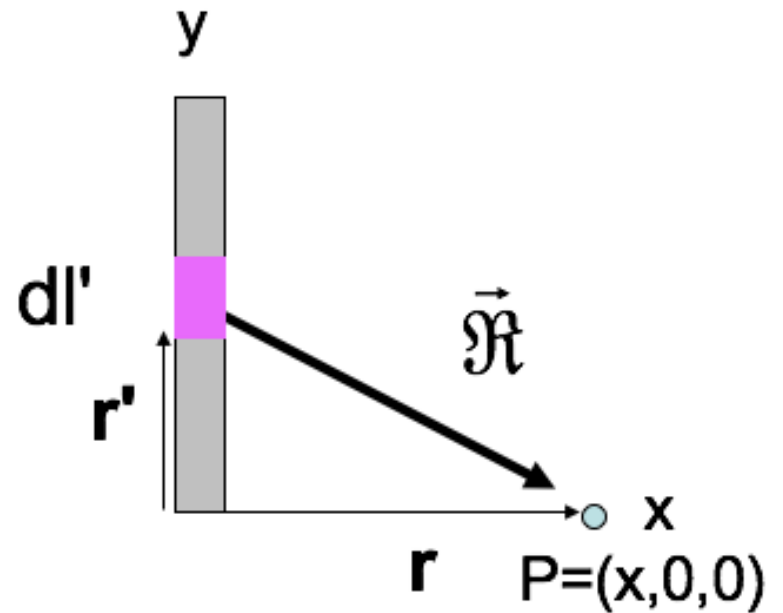
- A. $+(kq/a^2)\hat{y}$
- B. $-(kq/a^2)\hat{y}$
- C. 0
- D. Something entirely different!
- E. This is a nasty problem which I need more time to solve

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

$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0} \int \frac{\lambda dl'}{\mathfrak{R}^2} \hat{\mathfrak{R}}$$

What is \mathfrak{R} ?

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

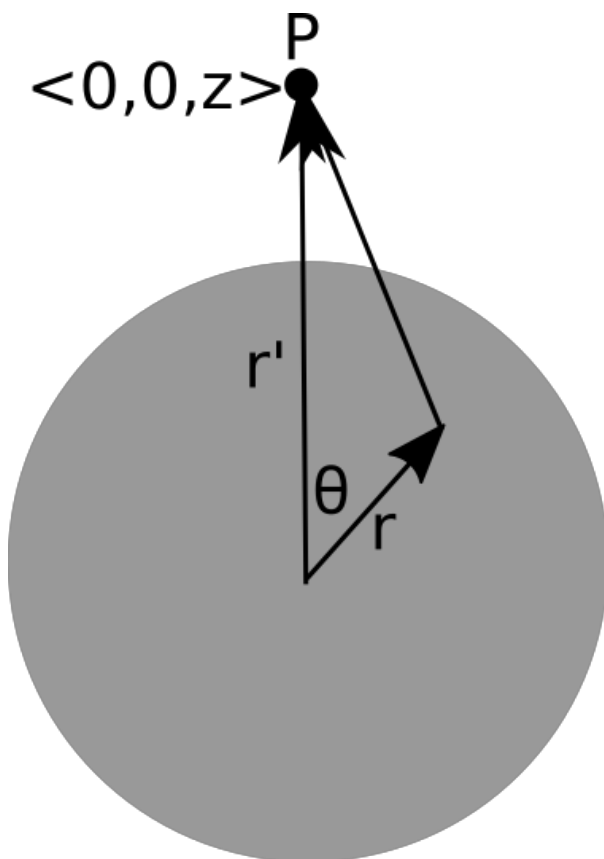


What do you expect to happen to the field as you get really far from the rod?

$$E_x = \frac{\lambda}{4\pi\epsilon_0} \frac{L}{x\sqrt{x^2 + L^2}}$$

- 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 $|\vec{\mathcal{R}}|$?



- 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

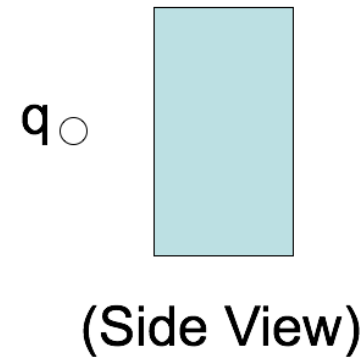
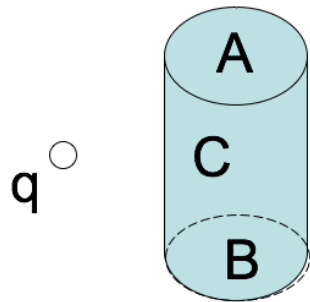
B. I and II only

C. I and III only

D. II and III only

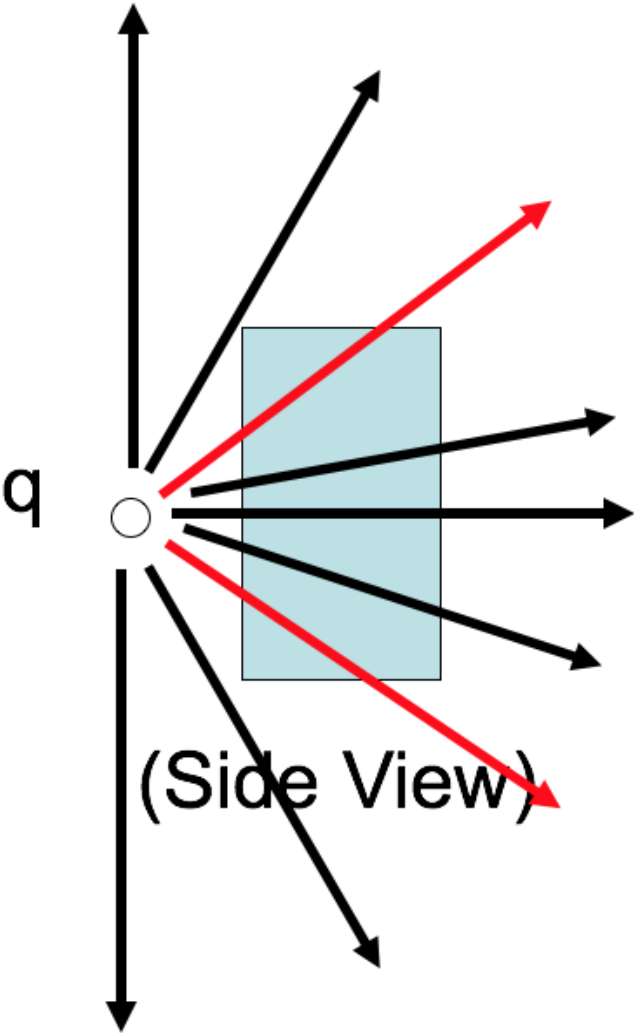
E. I, II, and III

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

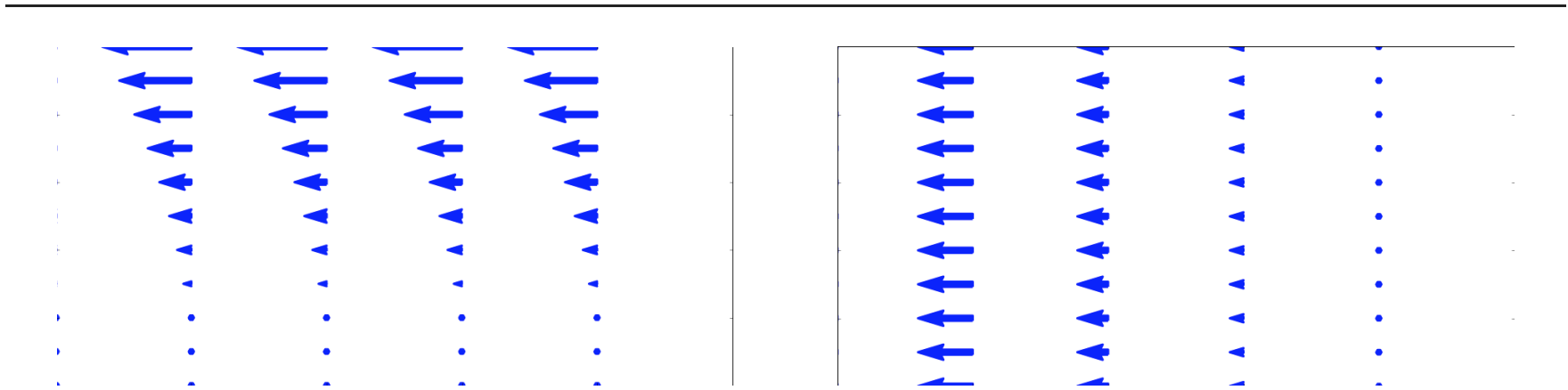
Let's get a better look at the side view.



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. ???