Announcements

- Happy Spooky Day!
- Homework
  - Homework 9 is posted and due on Monday (only 4 problems, but *do not* delay starting them)
  - Homework 10 is going to be super short (like 1 or 2 problems) and will be due a week from *Friday*
  - Homework 11 will be due after Thanksgiving
- Test 2 will be on November 12, take-home portion will be due on the 14th
- Online schedule has been updated to reflect all the above
- Reminder: Grade reports posted to WISE Dropbox
- Read the rest of Chapter 5 by Friday

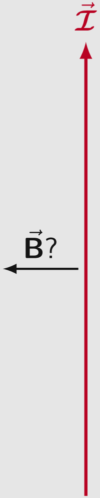
Q1

Ampere's Law will only be useful to us when there is sufficient symmetry to pull B out of the integral. So we need some methods to understand when we might have the needed symmetry.

For the case of an infinitely long wire, can $\vec{\mathbf{B}}$ point radially (i.e., in the $\hat{\mathbf{s}}$ direction)? *Can you explain WHY?*

A. Yes

B. No



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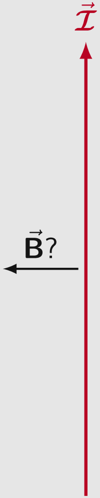

Q2

Continuing to refine our arguments, for an infinitely long straight wire, can $\vec{\mathbf{B}}$ depend on z or ϕ? *Why?*

A. Yes

B. No

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A. Yes

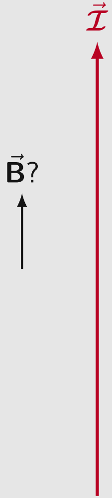
B. No

Q3

And finally, for an infinitely long straight wire, can $\vec{\mathbf{B}}$ have a component in the $\hat{\boldsymbol{z}}$ direction? *Why?*

A. Yes

B. No



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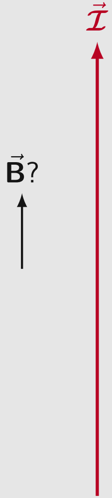

Q4

So our arguments got us a functional form of

$$\vec{\mathbf{B}}(\vec{\boldsymbol{r}}) = B(s)\hat{\phi}$$

For the case of an infinitely long *thick* wire of radius a, is this functional form still correct?

A. Yes
B. Only inside the wire ($s < a$)
C. Only outside the wire ($s > a$)
D. No

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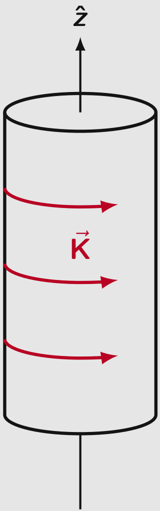
Q5

An infinite solenoid with surface current density $\vec{\mathbf{K}}$ is oriented along the z-axis. To use Ampere's Law, we need to argue what we know $\vec{\mathbf{B}}(\vec{r})$ should depend on and in what direction it should point.

For this solenoid, $\vec{\mathbf{B}}(\vec{r}) =$

A. $B(z)\hat{\mathbf{z}}$
B. $B(z)\hat{\phi}$
C. $B(s)\hat{\mathbf{z}}$
D. $B(s)\hat{\phi}$



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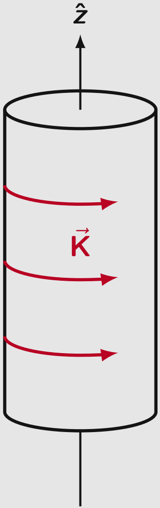
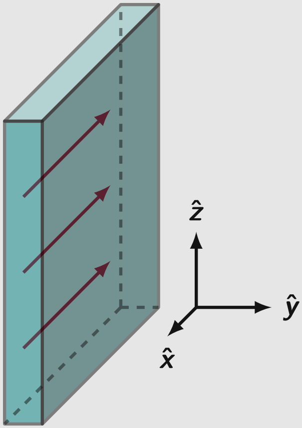


Q6



What do you expect $\vec{\mathbf{B}}(\vec{r})$ to look like for the infinite current sheet to the left?

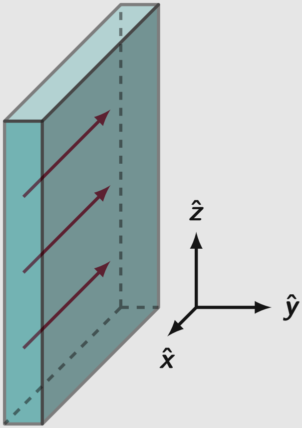
A. $B(y)\hat{\mathbf{y}}$

B. $B(z)\hat{\mathbf{y}}$

C. $B(y)\hat{\mathbf{z}}$

D. $B(z)\hat{\mathbf{z}}$

Q6



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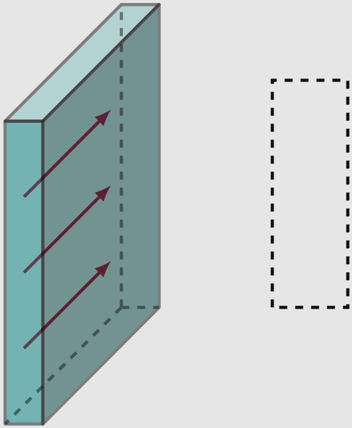
Q7



Suppose you drew the Amperian loop shown as a dashed line to the left. What would Ampere's Law tell you about the z-component of the magnetic field outside the current sheet?

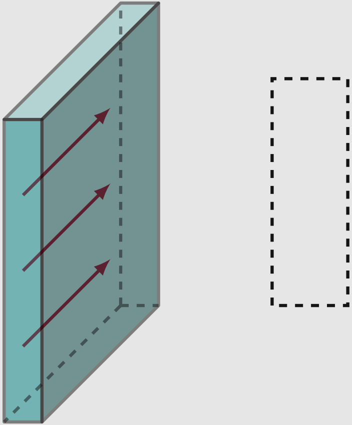
A. B_z is constant outside the sheet

B. B_z is 0 outside the sheet

C. B_z is not constant outside the sheet

D. It tells you nothing about B_z.

Q7



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