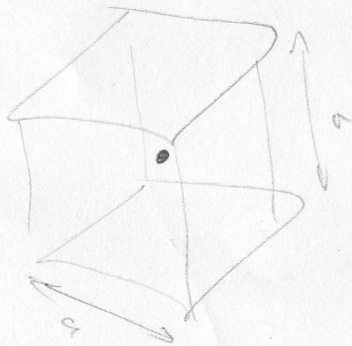
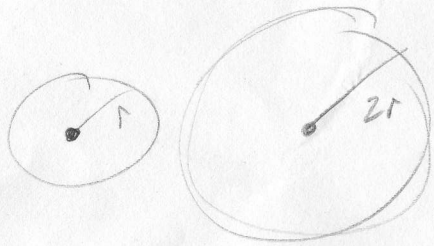


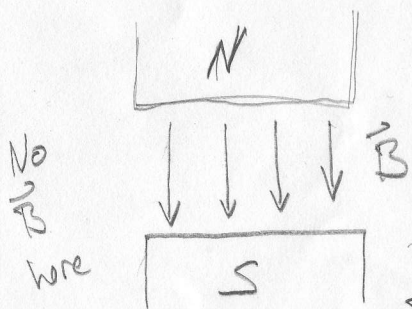
Given a point charge q , can you solve for the electric field at the surface of each shape? Using Gauss's law?



Why is this one tough?

#1

Why can't the field lines stop abruptly between two magnets?



This was a HW problem!

Hint: Use Ampere's Law - choose your path to make it simple

#3

What is Gauss's law for magnetism? How does it tell you that there are no magnetic monopoles?

* Bonus: What would it look like if there were magnetic monopoles?

#2

Maxwell's eq.'s are:

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0}$$

$$\vec{\nabla} \cdot \vec{B} = 0$$

$$\vec{\nabla} \times \vec{E} = -\frac{d\vec{B}}{dt}$$

$$\vec{\nabla} \times \vec{B} = \vec{J} + \frac{d\vec{E}}{dt}$$

$$\oint \vec{E} \cdot d\vec{a} = \frac{Q_{enc}}{\epsilon_0}$$

$$\oint \vec{B} \cdot d\vec{a} = 0$$

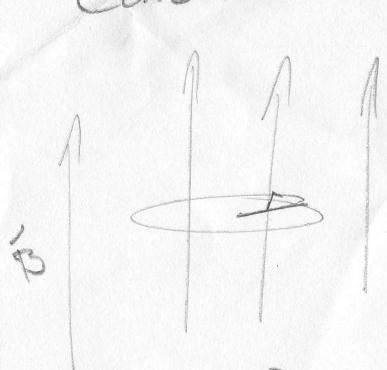
$$\oint \vec{E} \cdot d\vec{l} = -\int \frac{d\vec{B}}{dt} \cdot d\vec{a}$$

$$\oint \vec{B} \cdot d\vec{l} = \int \vec{J} \cdot d\vec{a} + \int \frac{d\vec{E}}{dt} \cdot d\vec{a}$$

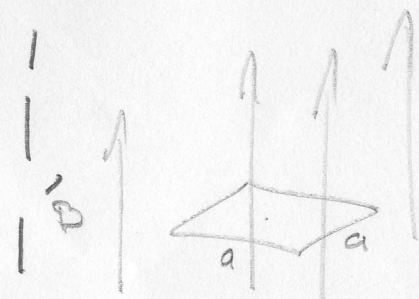
Write them down - and explain (give examples) of the usefulness of each of them

#4

Calculate the current in the wire:



Uniform \vec{B} ,
radius of the circle is
 $r(t) = r_0(1+t)$

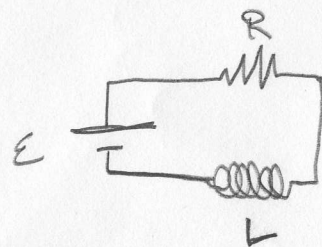


$$\vec{B}(t) = B_0(1+2t)$$

Both wires have res. R

#5

Write down the differential eq. for this circuit:



What would a graph of $I(t)$ look like?
What does L depend on?

#6

Assume charge Q on C at $t=0$



What does $Q(t)$
(charge on the capacitor)
and $I(t)$
(current across inductor)
look like?

Why are they out of phase? What
is the differential eq. for this system?
Relate this to spring block system.

#7

Let an electromagnetic wave \vec{v} move
in the \hat{z} direction:

What is $|\vec{v}| = ?$

Sketch \vec{v} along with \vec{E} and \vec{B}

#8

How do polarized sunglasses work?

Is the ^(or cause) effect different when we look at the sky vs. a lake?

What happens if we turn the sunglasses 90° ?

#9

Define monochromatic, constructive and destructive interference with pictures.

Given $E(x,t) = E_0 \cos(\omega t - kx + \phi)$

Sketch this. What is the amplitude, phase and wave length?

#10

What is the double-slit experiment? How does it show light as a particle? As a wave? Sketch the pattern it would make and explain what variables change its shape.

#11