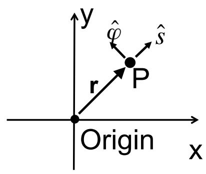
In cylindrical (2D) coordinates, what would be the correct description of the position vector **"r"** of the point P shown at (x,y) = (1, 1)



A) $\vec{\mathbf{r}} = \sqrt{2}\ \hat{s}$

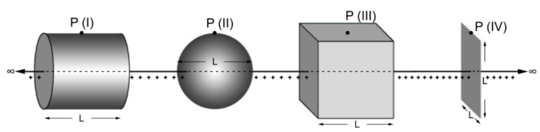
B) $\vec{\mathbf{r}} = \sqrt{2}\ \hat{s} + \pi / 4\, \hat{\varphi}$

C) $\vec{\mathbf{r}} = \sqrt{2}\ \hat{s} - \pi / 4\, \hat{\varphi}$

D) $\vec{\mathbf{r}} = \pi / 4\, \hat{\varphi}$

E) Something else entirely

4 surfaces are coaxial with an infinitely long line of charge with uniform λ. Choose all surfaces through which $\Phi_E = \lambda L / \varepsilon_0$



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

You have an E field given by
E = c **r** /ε_o, (Here c = constant,
r = spherical radius vector)

What is the charge density ρ(r)?

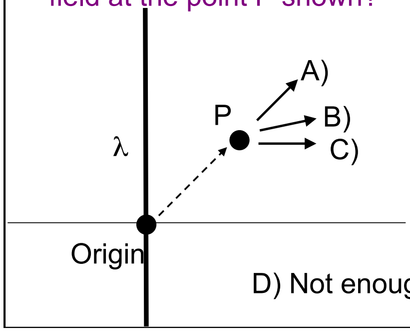
A) c B) c r C) 3 c
D) 3 c r^2
E) None of these is correct

Given **E** = c **r**/ε_o,
(c = constant, **r =** spherical radius vector)
We just found $\rho(r) = 3c$.
What is the total charge Q enclosed by an imaginary sphere centered on the origin, of radius R?

Hint: Can you find it two DIFFERENT ways?

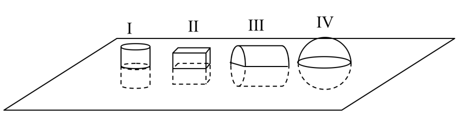
A) (4/3) π c B) 4 π c
C) (4/3) π c R^3 D) 4 π c R^3
E) None of these is correct

An infinite rod has uniform charge density λ. What is the direction of the E field at the point P shown?



D) Not enough info

Consider these four closed gaussian surfaces, each of which straddles an infinite sheet of constant areal charge density σ.
The four shapes are
I: cylinder II: cube III: cylinder IV: sphere
For which of these surfaces does gauss's law, $\oiint \vec{E} \cdot d\vec{\mathbf{A}} = Q_{enclosed} / \varepsilon_0$ help us find E near the surface??



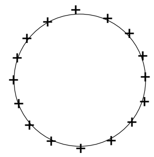
A) All B) I and II only C) I and IV only D) I, II and IV only
E) Some other combo!

6

2.26

A spherical *shell* has a uniform positive charge density on its surface. (There are no other charges around)

What is the electric field *inside* the sphere?



A: **E**=0 everywhere inside

B: **E** is non-zero everywhere in the sphere

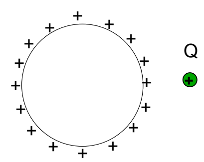
C: **E**=0 only at the very center, but non-zero elsewhere inside the sphere.

D: Not enough info given

2.29 alt

If we now place a charge Q just outside that insulating, spherical shell *(fixing* all surface charges uniformly around the sphere)

What is the electric field *inside* the sphere?



A: 0 everywhere inside

B: non-zero everywhere in the sphere

C: Something else

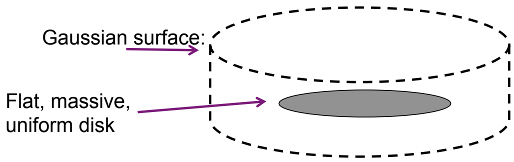
D: Not enough info given

When you are done with "white sheet", page 1, side 1, Click A

When you are done with both sides, Click B

If you are done with the YELLOW sheet, click C

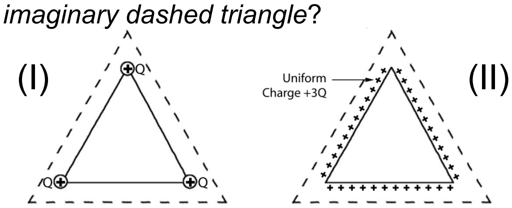
I would like to find the E field directly above the center of a uniform disk. Could we use Gauss' law with the Gaussian surface depicted below?



A) Yes, and it would be pretty easy…
B) Yes, but it's not at all easy.
C) No, Gauss' law applies, but it would not have been *useful* to compute E
D) No, Gauss' law would not even apply in this case

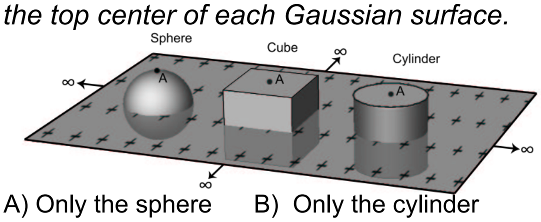
11

Which is true about **|E|** at points on the *imaginary dashed triangle*?



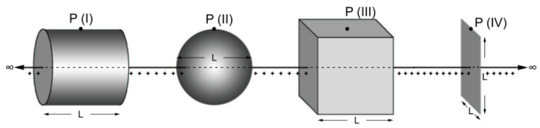
A. |**E**| same everywhere (uniform) in (I) ONLY
B. |**E**| uniform in (II) ONLY
C. Uniform in both, but *different* in cases I & II
D. Uniform in both, and same in cases I & II.
E. |**E**| varies from point to point in both cases

For which of these Gaussian surfaces will Gauss' law help us to calculate E at point A due to the sheet of charge? *Point A is at the top center of each Gaussian surface.*



A) Only the sphere B) Only the cylinder
C) Only the cylinder and the cube
D) Only the sphere and the cylinder
E) All surfaces will work

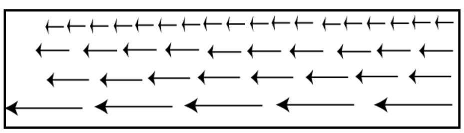
4 surfaces are coaxial with an infinitely long line of charge with uniform λ. Choose all surfaces which can be used to find E at point P using Gauss' law



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

1.7c

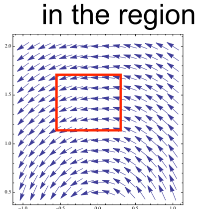
What is the curl of this vector field, in the region shown below?



A. non-zero everywhere
B. Non-zero at a limited set of points
C. zero curl everywhere
D. We need a formula to decide for sure

1.8

What is the curl of this vector field, **V** in the region shown below?

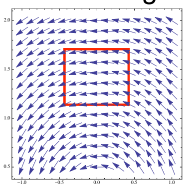


$\vec{\mathbf{V}} = c\,\hat{\varphi}$

A. non-zero everywhere
B. Zero at some points, non-zero others
C. zero curl everywhere shown

1.8

What is the curl of this vector field, **V** in the region shown below?



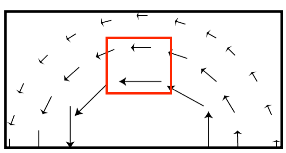
$$\vec{\mathbf{V}} = c\,\hat{\varphi}$$

$$\nabla \times \vec{\mathbf{V}} = \left[\frac{1}{s}\frac{\partial v_z}{\partial \phi} - \frac{\partial v_\phi}{\partial z}\right]\hat{s} + \left[\frac{\partial v_s}{\partial z} - \frac{\partial v_z}{\partial s}\right]\hat{\phi} + \frac{1}{s}\left[\frac{\partial (s v_\phi)}{\partial s} - \frac{\partial v_s}{\partial \phi}\right]\hat{z}$$

A. non-zero everywhere
B. Zero at some points, non-zero others
C. zero curl everywhere shown

1.8

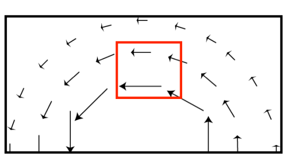
What is the curl of this vector field, in the red region shown below?



A. non-zero everywhere in the box
B. Non-zero at a limited set of points
C. zero curl everywhere shown
D. We need a formula to decide for sure

1.8

What is the curl of this vector field, in the red region shown below?



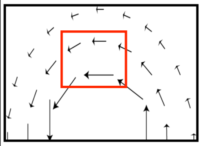
$$\vec{\mathbf{V}} = \frac{c}{s}\,\hat{\varphi}$$

A. non-zero everywhere in the box
B. Non-zero at a limited set of points
C. zero curl everywhere shown

1.8

What is the curl of this vector field, in the red region shown below?

$$\vec{\mathbf{V}} = \frac{c}{s}\hat{\varphi}$$

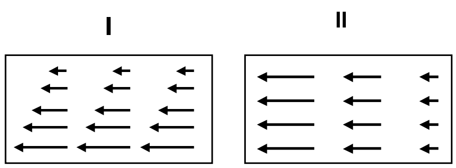


$$\nabla \times \vec{\mathbf{V}} = \left[\frac{1}{s}\frac{\partial v_z}{\partial \phi} - \frac{\partial v_\phi}{\partial z}\right]\hat{s} + \left[\frac{\partial v_s}{\partial z} - \frac{\partial v_z}{\partial s}\right]\hat{\phi} + \frac{1}{s}\left[\frac{\partial (s v_\phi)}{\partial s} - \frac{\partial v_s}{\partial \phi}\right]\hat{z}$$

A. non-zero everywhere in the box
B. Non-zero at a limited set of points
C. zero curl everywhere shown

2.43b/1.7b

Which of the following *could* be a static physical E-field in a small region?



A) Only I B) Only II
C) Both D) Neither
E) Cannot answer without further info