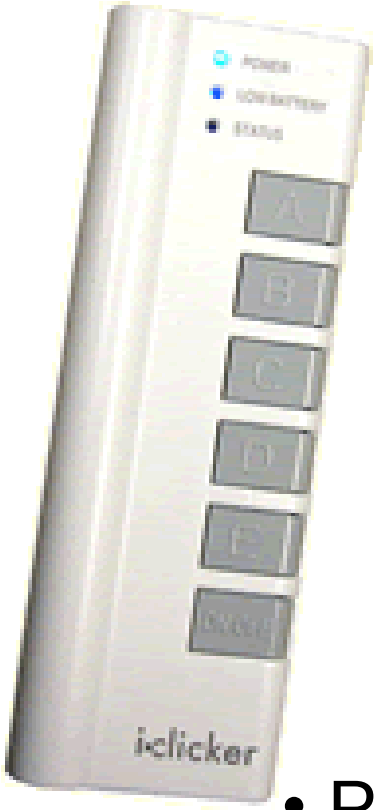
Pre-semester



Do you have an Iclicker to use for this term?

A) Yes, I do!

- Press & HOLD power (blue light *flashes)*
- Key in <u>AB</u> (OUR code for this room)
- Brief green Status flash confirms!
  (Blue light steady)

(You can do this only *while I'm collecting votes)*

Have you looked at the 3310 course web page yet?

A) Yes
B) Not yet

www.colorado.edu/physics/phys3310

Do office hours (homework help sessions)
Mon and Tues, 4-5+ PM
work for you?
(HW is due Wed at the start of class)

A) Yes, one or both is ok

B) Yes, but *only* if the “+” extends past 5

C) No, I really want a different day/time

D) No, but I’m unlikely to attend so it’s ok with me as it is…

Help/ HW study sessions

<u>Monday:</u>

A) 3-4

B) 4-5

C) 5-6

Help/ HW study sessions

<u>Tuesday:</u>

A) 3-4

B) 4-5

C) 5-6

Thinking of what you want to get out of your college education *and* this course, which of the following is *most* important to you?

A) Acquiring information (facts, principles, concepts, procedures)

B) Learning how to use information and knowledge in new situations

C) Developing lifelong learning skills

All three of these goals are clearly important. However, which of these three goals do you think you can do on our own (say, before class)?

A) Acquiring information (facts, principles, concepts, procedures)

B) Learning how to use information and knowledge in new situations

C) Developing lifelong learning skills

Chapter 1

Mathematical background

Two charges +Q and -Q are fixed a distance r apart. The direction of the force on a test charge -q at A is…

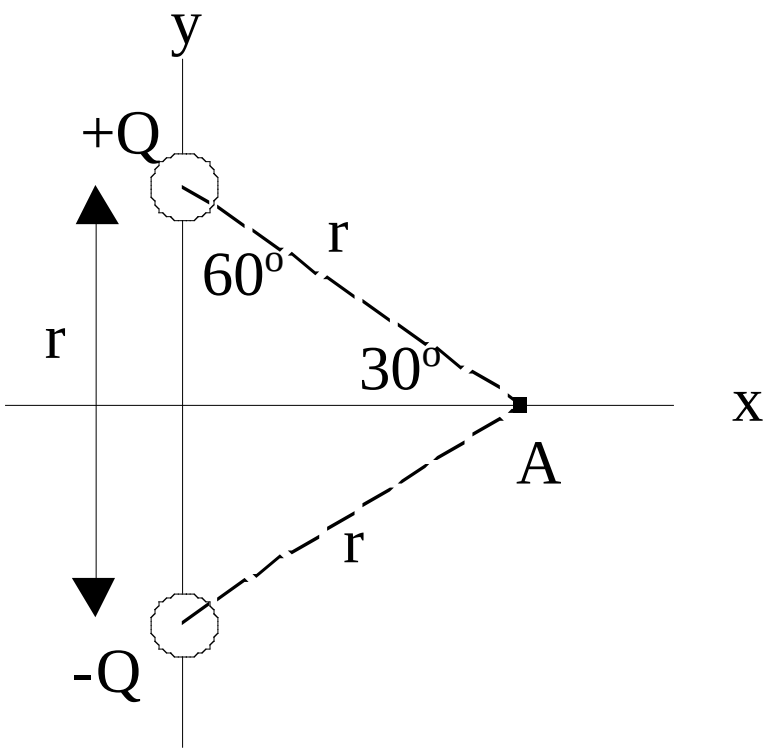
A. Up

B. Down

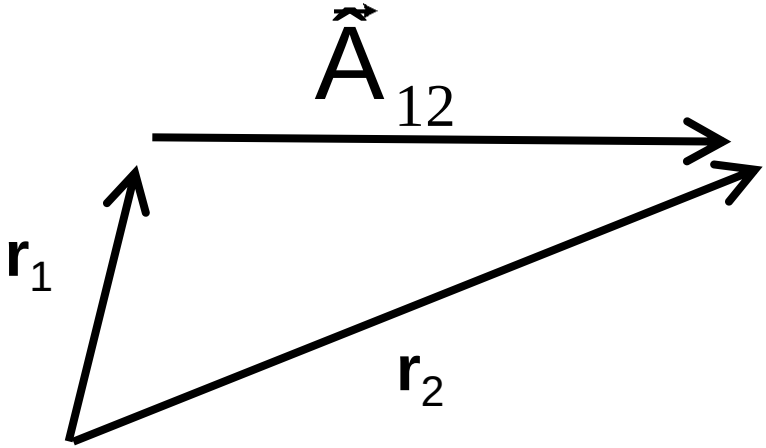
C. Left

D. Right

E. Some other direction, or F =0



How is the vector $\vec{\tilde{A}}_{12}$ related to $\mathbf{r}_1$ and $\mathbf{r}_2$?



A) $\vec{\tilde{A}}_{12} = \vec{r}_1 + \vec{r}_2$

B) $\vec{\tilde{A}}_{12} = \vec{r}_1 - \vec{r}_2$

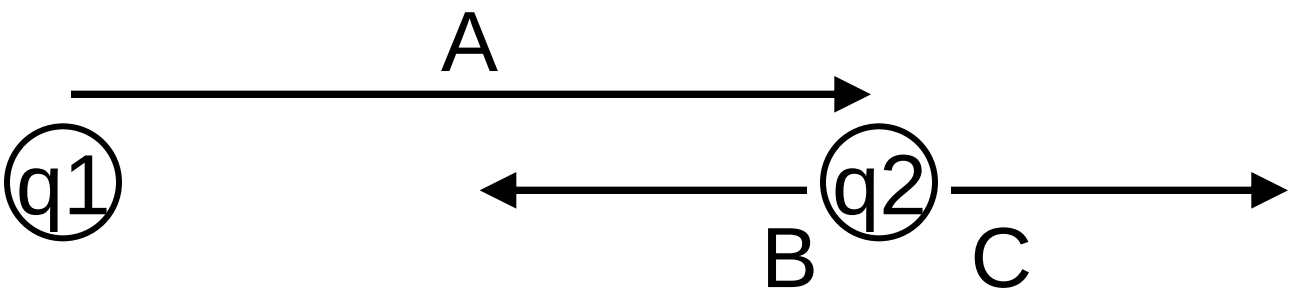
C) $\vec{\tilde{A}}_{12} = \vec{r}_2 - \vec{r}_1$

D) None of these

Coulomb's law: $\vec{\mathbf{F}}(\text{by 1 on 2}) = \dfrac{kq_1q_2}{\hat{A}_{12}^{2}}\hat{\hat{A}}_{12}$

In the fig, q1 and q2 are 2 m apart.

Which arrow *can* represent $\hat{\hat{A}}_{12}$?

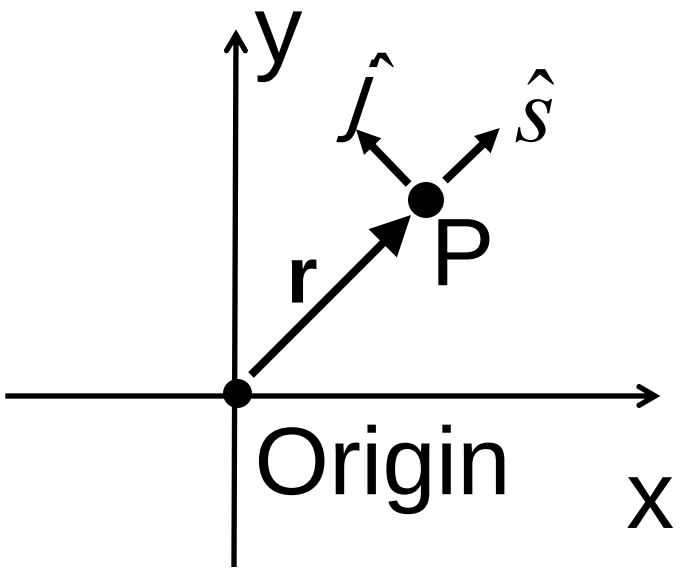


D) More than one (or NONE) of the above

E) You can't decide until you know if q1 and q2 are the same or opposite signed charges

1.1
a

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

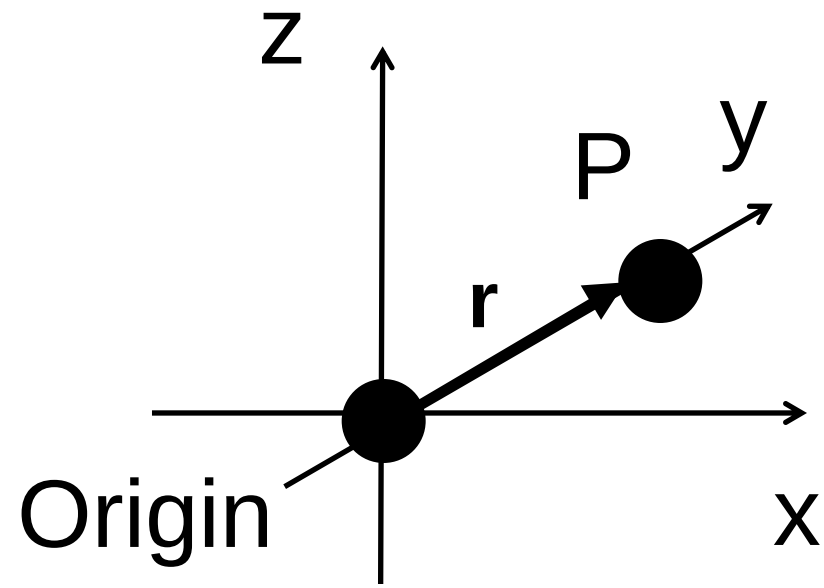
B) $\vec{\mathbf{r}} = \sqrt{2}\ \hat{s} + p/4\,\hat{j}$

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

D) $\vec{\mathbf{r}} = p/4\,\hat{j}$

E) Something else entirely

1.1 In spherical coordinates, what would be the correct description of the position vector **"r"** of the point P shown at (x,y,z) = (0, 2 m, 0)



A) $\vec{\mathbf{r}} = (2\ m)\,\hat{r}$

B) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + p\,\hat{q}$

C) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + p\,\hat{q} + p\,\hat{j}$

D) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + p\,\hat{q} + p/2\,\hat{j}$

E) None of these

What are the units of $\delta(x)$ if x is measured in meters?

A) δ is dimension less ('no units')
B) [m]: Unit of length
C) [m^2]: Unit of length squared
D) [m^{-1}]: 1 / (unit of length)
E) [m^{-2}]: 1 / (unit of length squared)

A point charge (q) is located at position **R,** as shown**.** What is ρ(r), the charge density in all space?

A) $r(\vec{\mathbf{r}}) = q\,d^3(\vec{\mathbf{R}})$

B) $r(\vec{\mathbf{r}}) = q\,d^3(\vec{\mathbf{r}})$

C) $r(\vec{\mathbf{r}}) = q\,d^3(\vec{\mathbf{r}} - \vec{\mathbf{R}})$

D) $r(\vec{\mathbf{r}}) = q\,d^3(\vec{\mathbf{R}} - \vec{\mathbf{r}})$

E) None of these/more than one/???

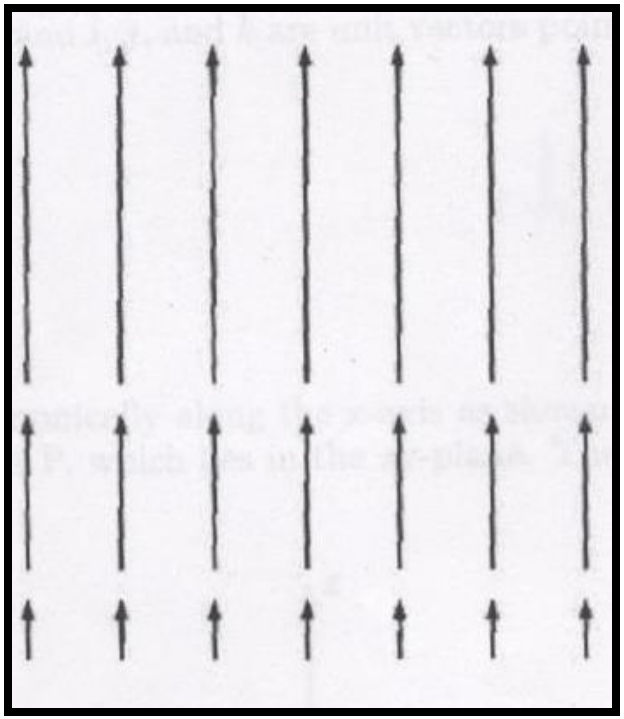
Given the formula $r(\mathbf{r}) = q\delta^{(3)}(\mathbf{r})$ what are the *units* of this delta function?

A) Unitless
B) Meters
C) Meters^3
D) Meters^-1
E) Meters^-3

What are the units of $\delta^3(\vec{\mathbf{r}})$ if the components of $\vec{\mathbf{r}}$ are measured in meters?

A) [m]: Unit of length
B) [m^2]: Unit of length squared
C) [m^{-1}]: 1 / (unit of length)
D) [m^{-2}]: 1 / (unit of length squared)
E) None of these.

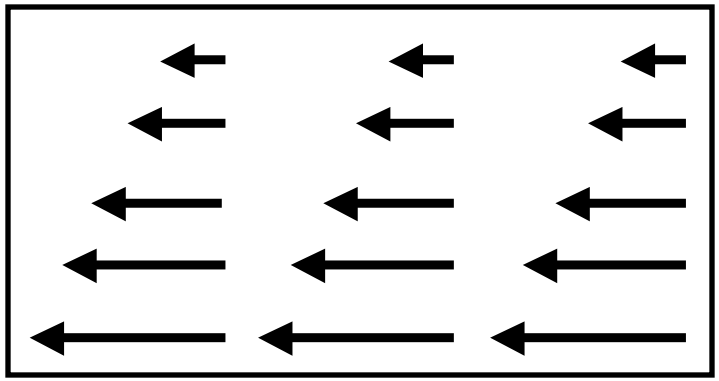
What is the divergence and curl of this vector field in the region shown?



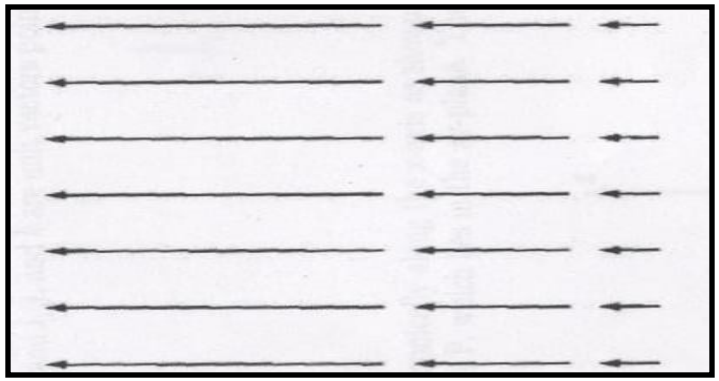
A) non-zero divergence, but zero curl.
B) zero divergence, but non-zero curl.
C) non-zero divergence, and non-zero curl.
D) zero divergence, and zero curl.
E) Impossible to predict, you need a formula!

Which of the following two fields has zero divergence?

I



II



A) Both do

B) Only I is zero

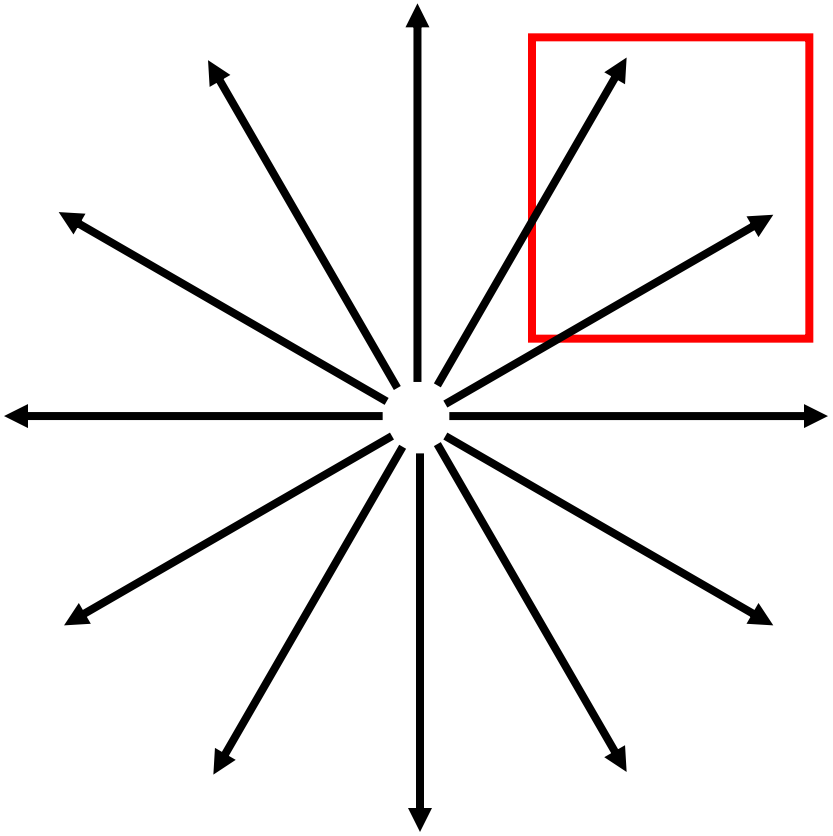
C) Only II is zero

D) Neither is zero

E) ??

What is the divergence of this vector field *in the boxed region?*

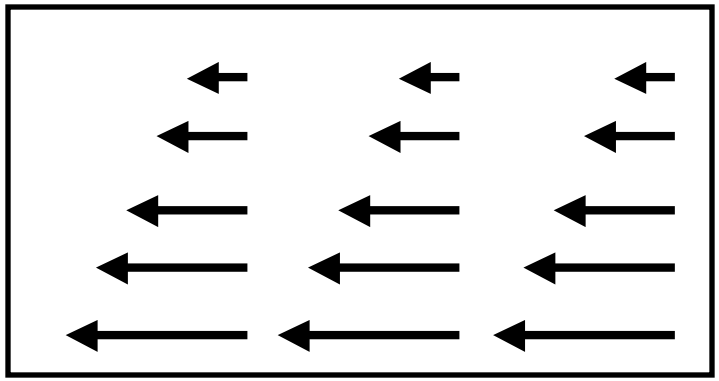
A) Zero
B) Not zero
C) Not enough info



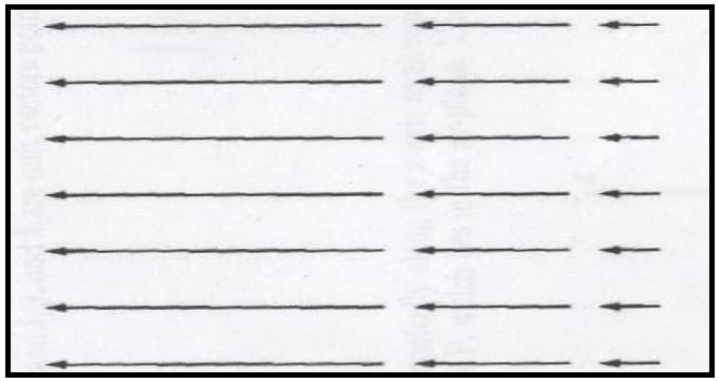
1.7a

Which of the following two fields has zero curl?

I



II



A) Both do

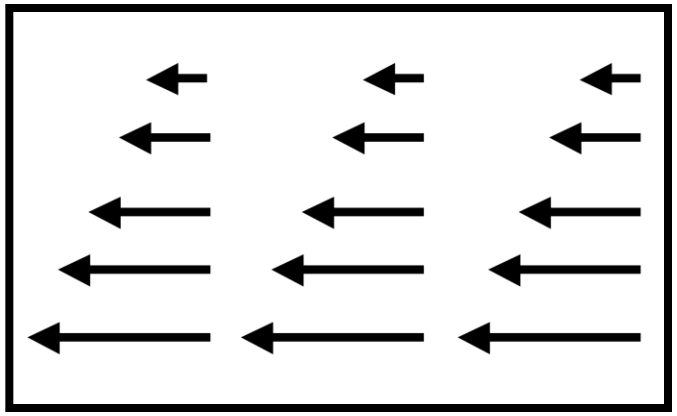
B) Only I is zero

C) Only II is zero

D) Neither is zero

E) ??

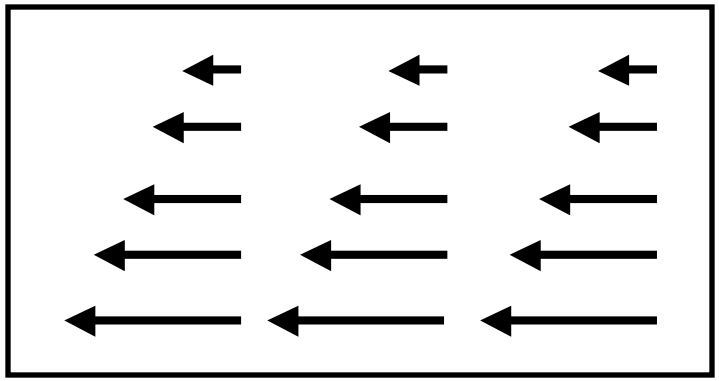
What is the curl of this vector field, in the region shown below?



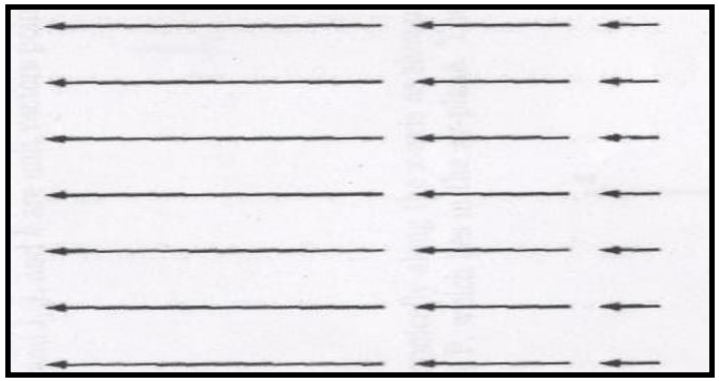
A. non-zero everywhere
B. Non-zero at a limited set of points
C. zero curl everywhere
D. We need a formula to decide for sure

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

I



II



A) Both

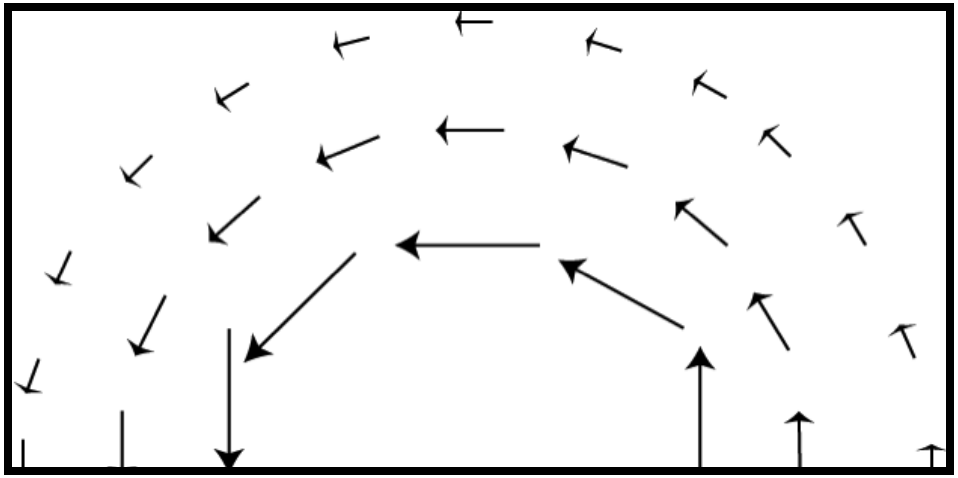
B) Only I

C) Only II

D) Neither

E) ??

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 shown
D. We need a formula to decide for sure