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

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…

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)
B) Learning how to use information and knowledge in new situations
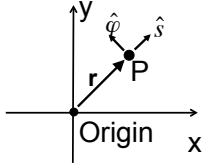C) Developing lifelong learning skills

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

A) Acquiring information (facts, principles, concepts)
B) Learning how to use information and knowledge in new situations
C) Developing lifelong learning skills
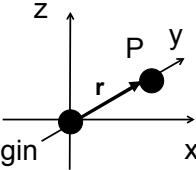

Chapter 1

Mathematical background

1.0

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

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) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + \pi\,\hat{\theta}$

C) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + \pi\,\hat{\theta} + \pi\,\hat{\varphi}$

D) $\vec{\mathbf{r}} = (2\ m)\,\hat{r} + \pi\,\hat{\theta} + \pi/2\,\hat{\varphi}$

E) None of these

1.2

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

A) $\rho(\vec{\mathbf{r}}) = q\delta^3(\vec{\mathbf{R}})$

B) $\rho(\vec{\mathbf{r}}) = q\delta^3(\vec{\mathbf{r}})$

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

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

E) None of these/more than one/???
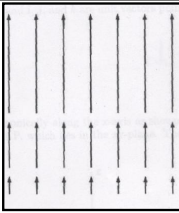
1.2

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

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

1.3

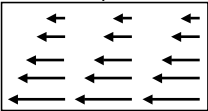What is the divergence and curl of this vector field in the region shown?

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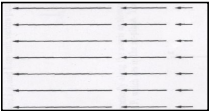D) zero divergence, and zero curl.
E) Impossible to predict, you need a formula!

1.4

Which of the following two fields has zero divergence?
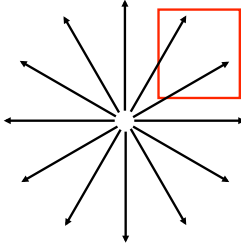
I   II

A) Both do   B) Only I is zero
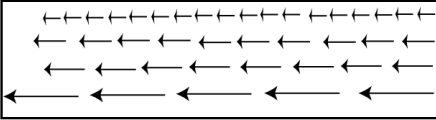C) Only II is zero   D) Neither is zero
E) ??

1.5

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

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

1.6

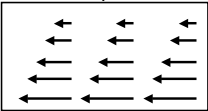**What is the divergence of this vector field, in the region shown below?**

A) Divergence is zero everywhere
B) Divergence is non-zero everywhere
C) Divergence is non-zero, but only at certain special points
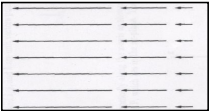D) We need a formula to decide for sure

1.7a

Which of the following two fields has zero curl?
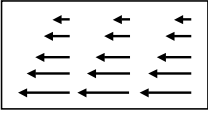
I

II

A) Both do
B) Only I is zero
C) Only II is zero
D) Neither is zero
E) ??

1.7b

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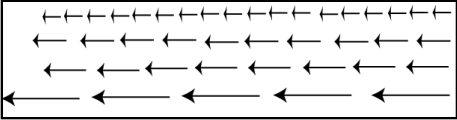
I   II

A) Both   B) Only I
C) Only II   D) Neither
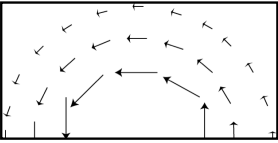E) ??

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, 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