Announcements

- Homework 3 posted, due on Monday
  - I might appreciate a few more people getting going and asking questions before Monday...
- I'll try to get HW2 graded before the end of the week
- I'm going to put a poll up on Campuswire about how you feel class hours are going or if there are things you think could be changed to assist you more
- Friday Reading: Ch 2.2.4, start Ch 2.3

A solid cylindrical rod is L meters long and has a radius of R. The pipe has a charge density given by

$$\rho(\vec{r}) = \rho_0 s$$

where s is the cylindrical coordinate. Approximately what is the magnitude of the electric field $2R$ from the center of the rod?

A. $\dfrac{\rho_0 R^2}{3\epsilon_0}$

B. $\dfrac{\rho_0 R^2}{6\epsilon_0}$

C. $\dfrac{2\pi\rho_0 R^3 L}{\epsilon_0}$

D. $\dfrac{\rho_0 R^3}{\epsilon_0}$

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where s is the cylindrical coordinate. Approximately what is the magnitude of the electric field $\frac{R}{2}$ from the center of the rod?

A. $\dfrac{\rho_0 R}{6\epsilon_0}$

B. $\dfrac{\rho_0 R^2}{6\epsilon_0}$

C. $\dfrac{\rho_0 R^2}{12\epsilon_0}$

D. $\dfrac{\rho_0 R^3 L}{8\epsilon_0}$

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What is the value of

$$\int_{-\infty}^{\infty} x^3 \delta(x-2)\, dx$$

A. 0
B. 4
C. 8
D. ∞

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In groups (to be determined), evaluate the following integrals, noting anything special you had to do or account for:

- Group A: $\int_{-\infty}^{\infty} xe^{x}\delta(x-1)\,dx$
- Group B: $\int_{\infty}^{-\infty} \log(x)\delta(x-2)\,dx$
- Group C: $\int_{-\infty}^{0} xe^{x}\delta(x-1)\,dx$
- Group D: $\int_{-\infty}^{\infty} (x+1)^{2}\delta(4x)\,dx$

In groups (to be determined), evaluate the following integrals, noting anything special you had to do or account for:

- Group A: $\int_{-\infty}^{\infty} xe^{x}\delta(x-1)\,dx = e$
- Group B: $\int_{\infty}^{-\infty} \log(x)\delta(x-2)\,dx = -\log(2)$
- Group C: $\int_{-\infty}^{0} xe^{x}\delta(x-1)\,dx = 0$
- Group D: $\int_{-\infty}^{\infty} (x+1)^2\delta(4x)\,dx = \frac{1}{4}$

Compute the following:

$$\int_{-\infty}^{\infty} x^2 \delta(3x+5)\, dx$$

A. $\frac{25}{3}$

B. $-\frac{5}{3}$

C. $\frac{25}{27}$

D. $\frac{25}{9}$

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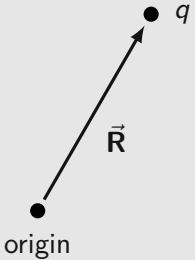
A point charge q is located at position $\vec{\mathbf{R}}$ as shown. What is $\rho(\vec{r})$, the charge density of all space?

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



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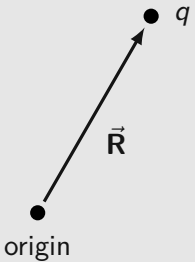

What are the units of $\delta^3(\vec{\boldsymbol{r}})$ if the components of $\vec{\boldsymbol{r}}$ are measured in meters?

A. $\delta^3(\vec{\boldsymbol{r}})$ is a unitless quantity
B. [m^3]: Units of length cubed
C. [m]: Units of length
D. [m^{-3}]: Units of inverse cubic meters

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