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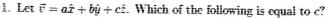
## Reading Quiz 3 for Electromagnetic Theory (PHYS330)

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## Abstract

A summary of content covered in chapter 3 (so far) of Introduction to Electrodynamics.

## Discussions about Vectors (Prelude to Fourier's Trick)









- 2. Let  $\vec{x} = \sum_{i=1}^{n} c_i \hat{x}_i$  be an *n*-dimensional vector and the set of  $\hat{x}_i$  represent orthonormal basis vectors. How do
  - A: x̂<sub>i</sub> · x̄
  - B: n = 7
- Suppose we are trying to develop the Fourier series for a function f(x). Recall the definition of a Fourier series:

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \sin(nx) + b_n \cos(nx) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \sin(nx) + \sum_{n=1}^{\infty} b_n^{(1)} \cos(nx)$$

However, the function we are trying to model is  $f(x) = \sin(3x)$ . Write down all coefficients in the Fourier series

The first interest we do trying so model is 
$$f(x) = \sin(\alpha x)$$
. Write down an elements in the rother series from  $n = 0$  to  $n = \infty$ .

$$f(x) dx = \int_{-\pi}^{\pi} f(x) dx = \int_{-\pi}^{\pi} f($$

- - 1. If  $V(x, y, z) \to 0$  as  $y \to \infty$ , which of the following cannot be part of the solution for V(x, y, z)?

     A:  $Y(y) = e^{-ky}$  A:  $Y(y) = \sinh(x)$  C:  $Y(y) = 1/y^2$  C:  $Y(y) = 1/y^2$  C:  $Y(y) = 1/y^2$  C:  $Y(y) = 1/y^2$

• A: 
$$Y(y) = e^{-ky}$$
  $e^{-ky}$ 

• C: 
$$Y(y) = 1/y^2$$

$$D: Y(y) = e^{-ky^2} \qquad \int_{C} \int_{C} dx$$

2. Below is Eq. 3.50 from section 3.3 of the

$$C_{n,m} = \frac{4V_0}{ab} \int_0^a \int_0^a \sin(n\pi y/a) \sin(n\pi z/a) dy dz$$
 (2)

Reproduce the result in Eq. 3.51 for  $C_{m,m}$ .

 $0 \qquad 1 = \pi$   $3 = \frac{1}{2\pi} \int_{\Lambda}^{\pi} f(x) dx = \frac{1}{2\pi} \int_{\Lambda}^{\pi} \frac{1}{2\pi} \frac{(3x) dx}{2\pi} = \frac{1 - (0s(3x))}{3} \int_{\Lambda}^{\pi}$  $=\frac{1}{2n}\left(\frac{-1--1}{3}\right)=0$ an = ( (3x) sin (ax) dx = ( -65 in (7an) / 1/2) bn= { sin(sx) (os (nx)dx=0 The first of good sine of the fore of good and one of the fore of good and one of an one of the fill the fore of good and one of an one of a and bre O.

2. (mm = ab Som (max), (5in (mile)) / 6 Cn, m = ab [ n/1 ] [ m/1 ] o = 90 [9(0)(m/1)-(-(05(0)), [6(0)(m/1)-0) = 96 [m (2001)] [ (05/m)] Men = 2 of the Whole rulen ing. 441011 No [mn - (050) = 0 400 . ~ 0 = 000 if both are odd

Y vo [inn-inn] [inn-inn] = 46 [inn]

ab [inn are]

abnown [inn]

abnown [inn]