Reading Quiz 3 for Electromagnetic Theory (PHYS330)

Dr. Jordan Hanson - Whittier College Dept. of Physics and Astronomy November 13, 2020

Abstract

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

Discussions about Vectors (Prelude to Fourier's Trick)

A:
$$\vec{v} \cdot \vec{v} - |\vec{v}|$$
B: $\vec{v} \cdot \hat{z}$

Let
$$\vec{v} = a\hat{x} + b\hat{y} + c\hat{z}$$
. Which of the following is equal to c ?

A: $\vec{v} \cdot \vec{v} - |\vec{v}|$

B: $\vec{v} \cdot \hat{z}$

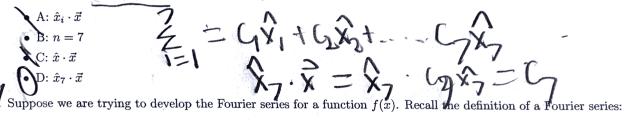
C: $\hat{x} \cdot \vec{v}$

Ox that

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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:
$$\hat{x}_i \cdot \vec{x}$$
B: $n = 7$



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

However, the function we are trying to model is $f(x) = \sin(3x)$. Write down all coefficients in the Fourier series from n = 0 to $n = \infty$.

Fourier's Trick and Boundary Value Problems

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

C:
$$Y(y) = 1/y^2$$

• D:
$$Y(y) = e^{-ky^2}$$

2 Below is Eq. 3.50 from section 3.3 of the text, with $V_0(y,z) = V_0$:

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

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

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