

Quiz #3

1. $\vec{v} = a\hat{x} + b\hat{y} + c\hat{z}$

$$c = \vec{v} \cdot \hat{z}$$

2. $\vec{x} = \sum_{i=1}^n c_i \hat{x}_i$

$$c_n = \vec{x} \cdot \hat{x}_n$$

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

$$\sin x = \frac{dx}{2} + a_n \sin(x) \quad \begin{aligned} a_0 &= 0 \\ a_n &= 1 \\ b_n &= 0 \end{aligned}$$

2. 11. \square

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

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

$$\int_0^a \sin\left(\frac{n\pi y}{a}\right) dy = -\cos\left(\frac{n\pi y}{a}\right) \frac{a}{\pi} \Big|_0^a = -\frac{a}{\pi} [\cos(n\pi) - \cos(0)] = \frac{2a}{\pi}$$

$$= \begin{cases} 0 & \text{if } n \text{ is even} \\ \frac{16V_0 a}{\pi^2 b} & \text{if } n \text{ is odd} \end{cases}$$