

Reading Quiz

Date 9/26/8

Reading: Griffiths, pages 56-78

1) In class, we have used a superposition of two sinusoidal waves of slightly different frequencies to conceptualize the difference between group and phase velocities. Griffiths

also derives $v_{group} = \frac{d\omega}{dk}$ and $v_{phase} = \frac{\omega}{k}$ for a wave packet. He has derived these

formulas:

Circle One:

- a) also by considering the addition of two sinusoidal waves
- b) by considering a wave-packet of narrowly peaked $\phi(k)$
- c) by drawing an analogy between “beats” and “wave packets”
- d) by applying Plancherel’s theorem to find $\phi(k)$ and $\omega(k)$

2) Construct ψ_2 , the separable solution of the harmonic oscillator and circle the correct answer, up to a normalization constant A_2 :

Hermite Polynomials:

$H_0 = 1,$ $H_1 = 2\xi,$ $H_2 = 4\xi^2 - 2,$ $H_3 = 8\xi^3 - 12\xi,$ $H_4 = 16\xi^4 - 48\xi^2 + 12,$ $H_5 = 32\xi^5 - 160\xi^3 + 120\xi.$

- a) $\psi_2 = A_2 e^{-\xi^2/2}$
- b) $\psi_2 = A_2 \xi e^{-\xi^2/2}$
- c) $\psi_2 = A_2 (\xi^2 + 2) e^{-\xi^2/2}$
- d) $\psi_2 = A_2 (2\xi^2 - 1) e^{-\xi^2/2}$
- e) none of the above