

Physics 115a

Homework 1 (due April 5 at start of class)

Assigned March 29

1.1) Consider a particle wavefunction which at a fixed time ($t = 0$) has the form

$$\Psi(x, 0) = \begin{cases} Ae^{ikx} & -1 < x < 1 \\ 0 & |x| \geq 1 \end{cases} \quad (1.1)$$

where A is real.

a) Find the value of A for which Ψ is “normalized” (so that the probability of finding the particle anywhere is unity).

b) Produce a plot on which you sketch (by hand is fine) the following three curves:

i) The probability density at $t = 0$ ($P(x, 0)$) as a function of x

ii) The real part of $\Psi(x, 0)$ as a function of x for $k = \pi$

iii) The imaginary part of $\Psi(x, 0)$ as a function of x for $k = \pi$

1.2) Griffiths problem 1.5

1.3) Read appendix A of Griffiths. Answer this problem with one of the following answers:

Answer 1: This material is familiar to me and I am prepared to use it in this class.

Answer 2: This material is not sufficiently familiar to me to use in this class, and my plan to address this problem is X (*You provide the plan*)

Note: Feel free to contact me to discuss this problem. Unless I get feedback otherwise from the class, I will assume you are sufficiently familiar with the material in Appendix A to use it in the course. If the material is not familiar, please send me email asap with the specifics. If there are topics the whole class does not know I may decide to lecture on some of them. If there are just individual deficiencies it will be the responsibility of the individual to address them. I can help you come up with a plan.