Physics 113 Quantum Theory Seminar

Assignment 1 January 23, 2013

This week we start to learn the *mathematical language of quantum mechanics*. We continue learning the mathematical language in the second seminar also. Much of this work should be review of mathematics you learned in linear algebra. *Learning the language of quantum mechanics BEFORE studying quantum mechanics is important.* The only way to do this is *LOTS of problems*. We will think about mathematics for two weeks.

Part 1: Readings

Zettili: Chapter 2

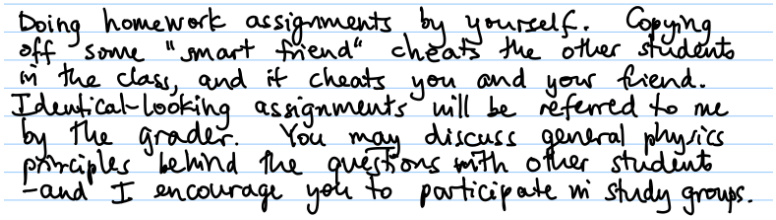
Sections: 2.1-2.4.4; 2.4.6-2.4.8; 2.5-2.5.3 + relevant solved problems

Boccio - Chapter 4 (Pages 241-277 Sections 4.1-4.16) ; Chapter 5(Pages 327-338 Sections 5.1-5.2).

You must do the readings BEFORE attempting the problems in order to get a good grasp of the overall content of the week's material to be understood. A problem should then make you look more carefully at specific parts of the readings that are necessary for the solution of that particular problem!

Prior to discussing any problems, we will deal with any questions and/or discussion of the readings.

Admonition #1



Admonition #2

Participating in class. Sitting there like a vege while other students think hard and bother to answer questions is parasitic, intellectually. Contribute.

Part 2: Problems

1. All problems will be discussed in seminar.
2. Random choice of presenter.
3. Quality/correctness of presentation = 50% Seminar grade.
4. If a problem is not solved by anyone, then it will be done in seminar.
5. Lots of short problems this week(much of it should be review)
6. I recommend, however, that you try as many of the other group's problems as you can.

Linear Algebra

1. Zettili 2.1 - Dirac Algebra
2. Zettili 2.6 - Properties of a Ket Vector
3. Boccio 4.22.3 - Orthogonal Basis Vectors
4. Boccio 4.22.5 - Matrix Representation and Expectation Value
5. Boccio 4.22.7 - Operator Algebra
6. Boccio 4.22.8 - Functions of Operators
7. Boccio 4.22.10 - Determinants and Traces
8. Boccio 4.22.11 - Function of a Matrix

Simple Probability Concepts

1. Boccio 5.6.1 (c) More about dice.
2. Boccio 5.6.1(d) Predict weather.
3. Boccio 5.6.1(e) Fire alarms.

4. Boccio 5.6.1(f) Even more about dice.
5. Boccio 5.6.1(h) Strange coins.
6. Boccio 5.6.1(j) Defective toy.
7. Boccio 5.6.1(k) Drug effectiveness.

Part 3: LaTeX Writeups

Random choice of writer(*one linear algebra and one probability problem from other group*) at end of seminar.

Turn in by email to instructor BEFORE next seminar.

Part 4: Midterm/Final Examinations

These examinations will be comprised of selected seminar problem solutions solved by you alone and handed in at the beginning of seminar. Each exam = 25% Seminar grade.