Due: Friday, 9/5, 2:10pm

Reading:

1. Feynman, R.P., *The Feynman Lectures on Physics*, Volume 1, all of Ch. 37 on "Quantum Behavior" (this book is on reserve at the library).

2. Griffiths, all of Ch. 1, pg.1-20.

3. Prepare for Reading Quiz: Friday, 9/5 (questions from reading Feynman).

4. Optional: all of Ch. 1 in Physlets (and/or CD), pg. 1-10

Problems:

1. An unbiased tetrahedral die (4 faces) is thrown and shows the number *n*. If this die is thrown very many times,

a) calculate $\langle n \rangle$ and

b) obtain σ (that is $\sqrt{\langle (\Delta n)^2 \rangle}$) in two different ways,

(i) by calculating $\sqrt{\langle (n - \langle n \rangle)^2 \rangle} = \sqrt{\sum (n - \langle n \rangle)^2 P(n)}$ and

(ii) by calculating $\sqrt{\langle n^2 \rangle - \langle n \rangle^2}$

2. Suppose that a certain probability distribution is given by $\rho(x) = \frac{9}{4}\frac{1}{x^3}$ for $1 \le x \le 3$.

Find the probability that a variable in this distribution lies between $\frac{5}{2} \le x \le 3$.

3. Consider a particle trapped in a well with potential given by:

$$V(x) = \begin{cases} 0 & 0 \le x \le a \\ \infty & \text{otherwise} \end{cases}$$

Show that $\Psi(x,t) = A\sin(kx)\exp(-iEt/\hbar)$ solves the Schrödinger equation provided that $E = \frac{\hbar^2 k^2}{2m}$.

Hint: The potential is infinite at $x = 0$ and a, therefore the particle can never be found outside of this range (do not consider that region). "Show" here means plug $\Psi(x,t)$ into the Schrödinger equation and confirm it is a solution.

4. A particle is in a state described by the unnormalized wavefunction:

$\Psi(x) = Ae^{-a|x|}$ a>0.

Find the length of an interval around the origin such that the probability of finding the particle in this interval is 40%.

5. Study Example 1.1 on page 10. Answer problem 1.2 on page 12.

6. Problem 1.9 (page 20)
7. Problem 1.14 (page 21)