

Week #1 Problem Set**Due date: Friday, January 29, 2010.****Basic Review, Coherence, and Semi-Classical Atomic Physics**

1. Sargent and Meystre, problem 1.8, p. 33.
2. Sargent and Meystre, problem 1.12, p. 33.
3. Sargent and Meystre, problem 1.14, p. 33 [eqn. 1.47 should read as eqn. 1.49].

Extra graduate student problem

4. Suppose we roll 6 dice. What is the probability that exactly 1 of these dice will land with the 5 side up? More generally, what is the probability that exactly n of the 6 dice will land with the 5 side up? If we repeat the 6 dice roll experiment many times, on average what is the number of dice that will land with the 5 side up? What is the expected standard deviation?

5. Show that the on-resonance total scattering cross-section for a classical atom is given by:

$$\sigma_{\text{classic, on-resonance}} = \frac{3}{2\pi} \lambda^2$$

where λ is the wavelength of incident on-resonance light.