Homework 1:

1. If we flip a fair coin 4 times, what is the probability of the following events?
   (a) HHTH
   (b) three heads
   (c) the first toss is a head
   (d) the third toss is a head
   (e) no consecutive tosses are the same

   For the following three problems, assume you are working within a one-period Binomial Asset Model:

2. For an initial stock value $S_0 = 10$, an interest rate $r = .05$, an up factor of $u = 3$, and a down factor of $d = \frac{1}{2}$, determine what the value and initial hedge of a European call option with strike $K = 9$ should have.

3. For a model that has interest rate $r = \frac{1}{4}$, up factor $u = 1.2$, and down factor .9, does this model admit arbitrage (explain why or why not, and if it does provide an example to exemplify how).

4. Using the values from problem 2, determine the value and initial hedge of a derivative security that pays at time 1, $V_1(\omega) = S_1(\omega)^2$.

   The following problems come from Shreve Volume 1:

5. Problem 1.1

6. Problem 1.2

7. Problem 1.3