Problem Set 7

Assigned: Apr. 1
Due: Apr. 10

You have a box with 5 coins.
2 of the coins are weighted so that they come up heads with probability 0.2. (Category 1)
2 are weighted so that they come up heads with probability 0.7. (Category 2)
1 is weighted so that it comes up heads with probability 0.9. (Category 3)

Note: You will probably want to use a calculator for parts C, D, and F.

A. What is the probability of heads, if you pick a coin at random and flip it?

B. Suppose that you pick three coins at random from the box and you flip each of them 10 times. What is the expected total number of heads? Justify your answer. (Hint: Use random variables. This is easy, once you have done part (A). If you start enumerating the possible combinations of categories, you are on the wrong track.)

C. Suppose that you pick a coin at random and flip it and it comes up heads. What are the probabilities of each of the categories? What is the probability that it will come up heads again if you flip it again?

D. Suppose that you pick a coin at random, flip it twice, and it comes up heads both times. What are the probabilities of each of the categories? What is the probability that it will come up heads again if you flip it again?

E. Someone makes you the following offer: You may pick a coin at random out of the box. You will be allowed to place a $10 bet on the outcome of a flip. How should you bet? What is the expected payoff of the game?

F. Now you get a better offer. As in (E) you may pick a coin at random out of the box and you will be allowed to place a $10 bet on the outcome of a flip. However, before placing the bet, you are allowed to flip it once to test it. What is the proper strategy for placing the bet after you have done the test flip? What, at the start, is the expected payoff from the game?