Exercise 1

There is a large bin of coins of different weightings:
40% of the coins are weighted so that they come up heads with probability 0.2.
40% are weighted so that they come up heads with probability 0.6.
20% are weighted so that they come up heads with probability 0.9.

The first two questions should not require Matlab.

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

B. Suppose that you pick four coins at random from the bin and you flip each of them 10 times. What is the expected total number of heads? Justify your answer.

For the rest of this problem you may use Matlab.

C. Suppose that you pick a coin at random and flip it and it comes up heads. 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 10 times, and it comes up heads 7 times. What now is the posterior probability of each of the weightings? Suppose that you flip it 20 times and it comes up heads 14 times?

E. Someone makes you the following offer: You may pick a coin out of the bin. You will be allowed to place a $10 bet on the outcome of a flip. Before placing the bet, however, you are allowed to flip it twice to test it. What is the proper strategy for placing the bet after you have done the test flips? What, at the start, is the expected payoff from the game?