Question 1
Suppose that a box contains five coins, and that for each coin there is a different probability that a head will be obtained when the coin is tossed. Let $p_i$ denote the probability of a head when the $i$th coin is tossed ($i = 1, 2, 3, 4, 5$), and suppose that $p_1 = 0, p_2 = 1/4, p_3 = 1/2, p_4 = 3/4$ and $p_5 = 1$. Suppose that one coin is selected at random from the box and when it is tossed once, a head is obtained. What is the probability that the $i$th coin was selected ($i = 1, 2, 3, 4, 5$)? Report the probability of each as a proportion. (Hint: Have a look at conditional probability rules and the law of total probability.)

Question 2

Question 3
Dixville Notch, New Hampshire is one of the smallest voting precincts in the United States, with 10 registered voters in the 2012 election. Suppose in this precinct that the probability a citizen votes is $p = .6$. What is the probability that exactly 5 citizens turn out to vote? (Hint: What is the probability mass function for the relevant probability distribution?)

Question 4
Revisit Question #3 in R. Do this in two ways. First, calculate the probability using the relevant probability distribution command in R. Second, run a Monte Carlo experiment where you simulate these 10 citizens’ choices of whether to vote based on a $p = .6$ probability of turning out. How do each of these results compare to your findings by hand in Question #3? For the second portion, I recommend at least 1,000 experimental iterations.