

Due: Thursday, August 11th, 2016

1. There are two dice, one red and one blue, sitting on a table. The red die is a standard die with six sides while the blue die is tetrahedral with four sides, so the outcomes 1, 2, 3, and 4 are all equally likely. A fair coin is flipped. If that coin comes up heads, the red die will be rolled, but if the coin comes up tails the blue die will be rolled.
 - (a) Find the probability that the rolled die will show a 1.
 - (b) Find the probability that the rolled die will show a 6.
2. A pair of dice are thrown. It is given that the outcome on one die is a 3. what is the probability that the sum of the outcomes on both dice is greater than 7?
3. A box contains B black balls and W balls, where $W \geq 3, B \geq 3$. A sample of three balls is drawn at random with each drawn ball being discarded (not put back into the box) after it is drawn. For $j = 1, 2, 3$ let A_j denote the event that the ball drawn on the j^{th} draw is white. Find $P(A_1)$, $P(A_2)$ and $P(A_3)$.
4. There are two sets of cards, one red and one blue. The red set has four cards - one that reads 1, two that read 2, and one that reads 3. An experiment involves flipping a fair coin. If the coin comes up heads a card will be randomly selected from the red set (and its number recorded) while if the coin comes up tails a card will be randomly selected from the blue set (and its number recorded). You can construct the blue set of cards in any way you see fit using any number of cards reading 1, 2, or 3. Explain how to build the blue set of cards to make each of the experimental outcomes 1, 2, 3 equally likely.
5. In the G.R.E advanced mathematics exam, each multiple choice question has 4 choices for an answer. A prospective graduate student taking the test knows the correct answer with probability $\frac{3}{4}$. If the student does not know the answer, she guesses randomly. Given that a question was answered correctly, find the conditional probability that the student knew the answer.
6. Manish is a student in a probability class. He gets a note saying, "I've organized a probability study group tonight at 7pm in the coffee shop. Come if you want." The note is signed "Hannah". However, Manish has class with two different Hannahs and he isn't sure which one sent the note. He figures that there is a 75% chance that Hannah A. would have organized such a study group, but only a 25% chance that Hannah B. would have done so. However, he also figures that if Hannah A. had organized the group, there is an 80% chance that she would have planned to meet on campus and only a 20% chance that she would have planned to meet in the coffee shop. While if Hannah B. had organized the group there is a 10% chance she would have planned for it on campus and a 90% chance she would have chosen the coffee shop. Given all this information, determine whether it is more likely that Manish should think the note came from Hannah A. or from Hannah B.