

April 12, 2012

1. Find the probability of each outcome when a loaded die is rolled if a 3 is twice as likely to appear as each of the other five numbers on the die.
  
  
  
  
  
  
  
  
  
  
2. Suppose we randomly select a permutation of the numbers 1, 2 and 3. What is the probability of the event E that 1 precedes 3?
  
  
  
  
  
  
  
  
  
  
3. (a) What is the probability that two people chosen at random were born on the same day of the week?
  
  
  
  
  
  
  
  
  
  
- (b) What is the probability that in a group of  $n$  people chosen at random, there are at least two of them born on the same day of the week?
  
  
  
  
  
  
  
  
  
  
- (c) How many people chosen at random are needed to make the probability greater than  $1/2$  that there are at least two people born on the same day of the week?

4. Find the probability that a randomly generated bit string of length 10 begins with a 1 or ends with a 00 if bits are generated independently and if

(a) a 0 bit and a 1 bit are equally likely.

(b) the probability that a bit is 1 is .6.

(c) the probability that the  $i$ th bit is a 1 is  $1/2^i$  for  $i = 1, 2, 3, \dots, 10$ .

5. What is the expected number of heads when a fair coin is flipped 10 times?

6. What is the expected sum of the numbers that appear when three fair dice are rolled?

7. Suppose we flip a fair coin until it comes up tails twice or we have flipped it 6 times. What is the expected number of times we flip the coin?
8. A dodecahedral die has 12 faces that are numbered 1 through 12.
- (a) What is the expected value of the number that comes up when a fair dodecahedral die is rolled?
  - (b) What is the variance of the number that comes up when a fair dodecahedral die is rolled?