

1. A bowl has 90 marbles: 50 red (numbered 1-50), 30 green (numbered 1-30), and 10 white (# 1-10).
 - a) find $P(\text{red})$
 - b) find $P(25 \mid \text{green})$
 - c) are the events 'green' and '9' independent? Give the relevant probabilities that show why/why not.
 - d) If you choose 6 with replacement, find $P(\text{at least one white})$.
2. If $P(A)=.3$, $P(B)=.4$, and $P((A \cup B)^C)=.4$
 - a) find $P(A \cap B)$
 - b) find $P(B|A^c)$
 - c) are A and B independent?
3. If $P(A \cap B|A)=.5$, $P(B)=.5$, and $P(A \cup B)=.7$ find $P(A)$.
4. There are two buckets: bucket one has the numbers 1 and 2; bucket two has the numbers 0, 2, 4, 5. If you randomly take one number out of each bucket,
 - a) give the sample space.
 - b) find the probability that you get at least one even number.
5. An unfair coin has a 1 on one side and a 2 on the other. The probability that the coin comes up 1 is p. You toss the coin and then take a number from one of the buckets in problem 4 (if the coin comes up 1, choose from bucket 1; if the coin comes up 2, choose from bucket 2). Let X be the number you get from the bucket. Find:
 - a) $P(X=\text{even})$
 - b) $P(\text{came from bucket 2} \mid X=\text{even})$.
6. Suppose 20% of the parents in a population have blue eyes, 70% have brown eyes, and the rest have green eyes (assume in this population parents always have the same eye color). Suppose further that: 70% of the children of blue eyed parents are blue eyed, 10% are brown eyed, and the rest have green eyes; 20% of the children of brown eyed parents are blue eyed, 60% are brown eyed, and the rest have green eyes; 30% of the children of green eyed parents are blue eyed, 10% are brown eyed, and the rest have green eyes. If you choose a random child, find: $P(\text{parents have blue eyes} \mid \text{child has blue eyes})$
7. An electronic system has four components divided into two parts. The two components of each pair are wired in series; the two pairs are wired in parallel. Let A_{ij} denote the event that i^{th} component in j^{th} pair fails, $i=1,2$; $j=1,2$. Let A be the event "system fails". Write A in terms of the A'_{ij} s.
8. A computer maker gets chips from three manufacturers. 2% of the chips from manufacturer A are defective; 3% of the chips from manufacturer B are defective; 1% of the chips from manufacturer C are defective. If the computer maker gets 40% of their chips from A, 35% from B, and the rest from C:
 - a) find the probability a random chip is defective.
 - b) find $P(A \mid \text{defective})$.
9. You roll a die twice. If $X=|(\text{roll on die 1})-(\text{roll on die 2})|$, then
 - a) give the sample space.
 - b) give the probability distribution.
10. If 60% of a department store's customers are female and 75% of the female customers have charge accounts at the store, what is the probability that a customer selected at random is a female and has a charge account?