1. Exercise 2.32

(a) In how many ways can one component of each type be selected? \((5)(4)(3)(4) = 240\)

(b) In how many ways can components be selected if both the receiver and the DC are Sony? \((1)(1)(3)(4) = 12\)

(c) In how many ways can components be selected if none of them are Sony? \((4)(3)(3)(3) = 108\)

(d) In how many ways can components be selected if at least one component is Sony? \(240 - 108 = 132\)

\[
P(\text{at least one is Sony}) = \frac{132}{240} = .55
\]

\[
P(\text{exactly one is Sony}) = P(\text{only receiver is Sony}) + P(\text{only CD player is Sony}) + P(\text{only tape deck is Sony})
\]

\[
= \left(\frac{3(3)(3) + (4)(1)(3)(3) + (4)(3)(3)(1)}{240}\right) = \frac{90}{240} = .413
\]

2. Exercise 2.38 A box contains four 40-W light bulbs, five 60-W bulbs and six 75-W light bulbs. Select three of the bulbs at random.

(a) \(P(\text{two are 57-W}) = \frac{\binom{6}{2}\binom{9}{1}\binom{15}{3}}{\binom{15}{3}} = .2967\)

(b) \(P(\text{all three the same}) = \frac{\binom{4}{3} + \binom{5}{3} + \binom{6}{3}}{\binom{15}{3}} = .0747\)

(c) \(P(\text{one bulb of each type}) = \frac{\binom{4}{1}\binom{5}{1}\binom{6}{1}}{\binom{15}{3}} = .2637\)

(d) Suppose the bulbs are to be selected one by one until a 75-W bulb is found. What is the probability the it is necessary to examine at least six bulbs?

First, not that

\[
P(\text{examine at least six}) = 1 - P(\text{examine at most five})
\]

\[
= 1 - P(1) - P(2) - P(3) - P(4) - P(5)
\]

Now, if the first one is a 75-W bulb, there are 6 ways to accomplish that, and there are 15 bulbs, so \(P(1) = 6/15\).

If the second is the first 75-W bulb picked, there are (9)(6) ways to do that, and there are (15)(14) ways to pick two of the fifteen bulbs. We proceed in a similar fashion to find that

\[
P(\text{examine at least six})
\]

\[
= 1 - P(1) - P(2) - P(3) - P(4) - P(5)
\]

\[
= 1 - \frac{6}{15} - \frac{9(6)}{(15)(14)} - \frac{9(8)(6)}{(15)(14)(13)} - \frac{9(8)(7)(6)}{(15)(14)(13)(12)} - \frac{9(8)(7)(6)(6)}{(15)(14)(13)(12)(11)}
\]

\[
= 1 - .4 - .2571 - .1582 - .0923 - .0503 = .0421
\]
3. **Exercise 2.46** Let $A =$ individual is more than 6 feet, $B =$ individual is basketball player. $P (A|B)$ is the probability that a basketball player is more than 6 feet tall (fairly likely!), and $P (B|A)$ is the probability that a person who is more than 6 feet tall is a basketball player. Since most every basketball player is more than 6 feet tall, $P (A|B)$ is fairly large, while there are a lot of tall people who are not basketball players. Therefore we would expect that $P (A|B) > P (B|A)$.

4. **Exercise 2.86**
   
   (a) $\left(\begin{array}{c} 20 \\ 3 \end{array}\right) = 1140$
   
   (b) $\left(\begin{array}{c} 19 \\ 3 \end{array}\right) = 969$
   
   (c) Number of crews having at least one of the 10 best = $1140 -$ number of crews having none of the ten best
      
      $= 1140 - \left(\begin{array}{c} 10 \\ 3 \end{array}\right) = 1140 - 120 = 1020$
   
   (d) $P ($best will not work$) = \frac{969}{1140} = .85$