Chapter 3

3.2 An outcome is something that might be observed in an experiment. The sample space consists of all possible outcomes. An event is a subset of the sample space that is formed by outcomes that share a common attribute.

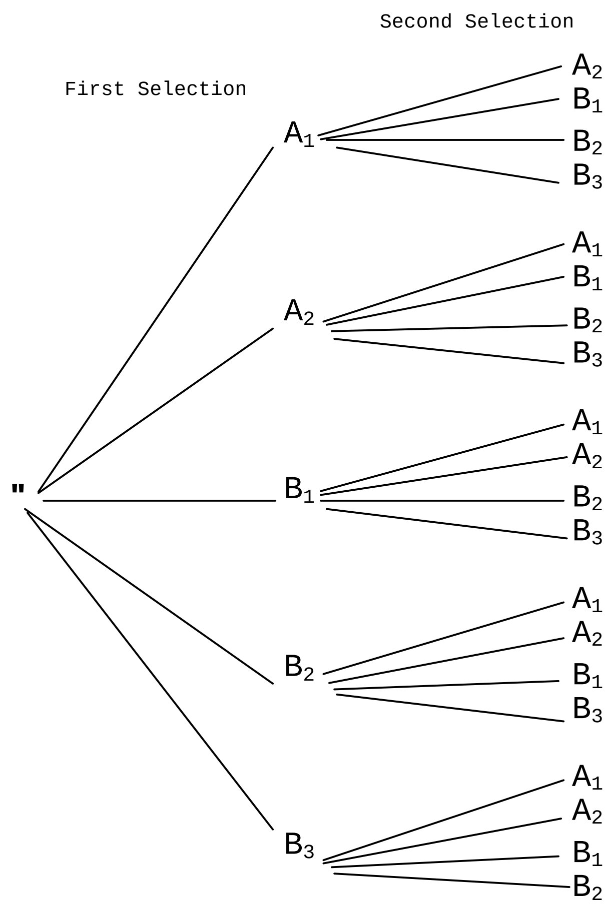
3.4 Although the chance of something major failing on a space craft is minuscule, we can observe it actually happens in fewer than 300 years, as it did. The occurrence of a highly unlikely event, such as the Challenger accident, is a reminder that probability is not tied to a fixed number of trials.

3.6 A probability of 0.2 does not mean that we will observe that event exactly two times in ten attempts. As long as there is a limited number of trials we cannot guarantee that a relative frequency of 0.2 will be realized.

3.8 They differ because one refers to a fixed number of trials and the other refers to an infinite number of trials.

3.10 Let A_i be the event Aselect the computer A_i(I=1,2)@ and B_j be the event Aselect computer B_j(j=1,2,3)@ in the following diagram.

Tree Diagram of Computer Selection



OUT-COME	PROBABILITY OF BRANCH OUTCOME
A_1 A_2	(1/5)(1/4) = 1/20
A_1 B_1	(1/5)(1/4) = 1/20
A_1 B_2	(1/5)(1/4) = 1/20
A_1 B_3	(1/5)(1/4) = 1/20
A_2 A_1	(1/5)(1/4) = 1/20
A_2 B_1	(1/5)(1/4) = 1/20
A_2 B_2	(1/5)(1/4) = 1/20
A_2 B_3	(1/5)(1/4) = 1/20
B_1 A_1	(1/5)(1/4) = 1/20
B_1 A_2	(1/5)(1/4) = 1/20
B_1 B_2	(1/5)(1/4) = 1/20
B_1 B_3	(1/5)(1/4) = 1/20
B_2 A_1	(1/5)(1/4) = 1/20
B_2 A_2	(1/5)(1/4) = 1/20
B_2 B_1	(1/5)(1/4) = 1/20
B_2 B_3	(1/5)(1/4) = 1/20
B_3 A_1	(1/5)(1/4) = 1/20
B_3 A_2	(1/5)(1/4) = 1/20
B_3 B_1	(1/5)(1/4) = 1/20
B_3 B_2	(1/5)(1/4) = 1/20

3.12 The number of permutations of three members that can be selected from 10 is (10)(9)(8) = 720.

3.14 Probability that the most able is hired when two are randomly hired from six is

$$\frac{C(1,1)\,C(5,1)}{C(6,2)} = \frac{\frac{1!}{1!0!}\,\frac{5!}{1!4!}}{\frac{6!}{2!4!}} = \frac{1}{3}$$

3.16 The probability that both engines will start on the first try is $\frac{C(3,2)}{C(5,2)} = \frac{3}{10}$

3.18 The tree diagram would yield the following, where Y is burglared and N is not burglared.

Branch	P(Branch)	Branch	P(Branch)
YYYY 4	0.00000001	NYYY 3	0.00000099
YYYN 3	0.00000099	NYYN 2	0.00009801
YYNY 3	0.00000099	NYNY 2	0.00009801
YYNN 2	0.00009801	NYNN 1	0.00970290
YNYY 3	0.00000099	NNYY 2	0.00009801
YNYN 2	0.00009801	NNYN 1	0.00970290
YNNY 2	0.00009801	NNNY 1	0.00970290
YNNN 1	0.00970290	NNNN 0	0.96059000

Thus, the probabilities of 4, 3, 2, 1, and 0 burglared cars are 0.00000001, 0.00000396, 0.000058806, 0.0388116, and 0.96059000.

3.20 a. False; if $P(A_1|A_2) = P(A_1)$, then they are independent.

b. True; $P(A_1|A_2) = 0$ implies $P(A_1|A_2) = P(A_1 \text{ and } A_2)/P(A_2) = 0$ and thus implies $P(A_1 \text{ and } A_2) = 0$.

c. False; two probabilities do not need to be the same for independent events.

3.22 If P(A) is the probability that a female executive is harassed and P(B) is the probability of reporting it, then P(A) = 0.27 and P(B|A) = 0.25, and the probability a female executive is harassed and reports it is P(A and B) = P(A) P(B|A) = 0.0675.

3.24 Let P(A) = 0.66 be the probability that an institutional investor favors the creation of a compensation committee, and let P(B) = 0.50 be the probability that an institutional investor favors a compensation committee with the power to hire and pay compensation consultants. We could calculate P(A and B) = 0.33 if A and B are independent. If A and B are dependent, then the probability that an institutional investor favors the creation of a compensation committee that has the power to hire and pay compensation consultants cannot be determined.

3.26 P(A) = 0.07 and P(B) = 0.76, where P(A) is the probability of a company having a complete understanding of the act and P(B) is the probability of a company being worried. Because A and B are independent, P(A and B)= P(A) P(B) = (0.07)(0.76) = 0.0532

3.28 $P(A|B) = 0.75$ and $P(B) = 0.2$, where $P(A)$ is the probability of the real estate stock rising, and $P(B)$ is the probability of the stock market rising. Thus, $P(A \text{ and } B) = P(A|B)\,P(B) = (0.75)(0.20) = 0.15$

3.30 P(drive is from the first supplier given it is defective) = P(drive is defective and it is from the first supplier) divided by P(a drive is defective), which is equal to P(drive is defective given it is from the first supplier) times P(drive is from the first supplier) divided by P(drive is defective) = $(0.06)(0.80)/(0.05) = 0.96$.

3.32 The probability that all three saying the same tire is $4/64 = 0.0625$. Given the first student says left front the probability that the other two say left front is 0.25.