

Practice Problems for Chapter 3

OpenIntro P.92 #3.1, 3.3, 3.9

P.109 #3.13, 3.15, 3.17;

P.111 #3.19, 3.21

P.129 #3.40, 3.41

Course Pack P.72 # 4.1, 4.3 4.5, 4.7;

P.79 #4.17, 4.23, 4.27

P.92 #4.43, 4.47, 4.51, 4.59, 4.63;

P.103 # 4.73, 4.75

1. A basketball player is going to select a sneaker with red, blue, or green stripes in either low- or high-top style. An experiment consists of recording the colour and style. Sketch a tree diagram and find the sample space for this experiment.
2. An experiment has sample space $S = \{a, b, c, d, e, f, g, h\}$ and events $A = \{a, c, e, g\}$, $B = \{b, c, f\}$, $C = \{c, f, g, h\}$, $D = \{a, b, d, e\}$. List the outcomes in each of the following events. (a) A' (b) $A \cap B$ (c) $A \cup D$ (d) $C \cap D$ (e) $A \cup B \cup C$
3. Jenny transcribes music in the following genres: video game themes, acapella, or jazz. An experiment consists of recording the preferred genre for the next customer and the number of songs they purchase (assume 5 is the maximum). Consider the events A = the next customer prefers video game themes, B = the next customer prefers jazz and buys at least three songs, C = the next customer buys at most two songs, D = the next customer prefers acapella and buys at least one song. Carefully describe the outcomes in each of the following events: (a) A' (b) $A \cup C$ (c) $A \cap B$ (d) $C \cap D$
4. Consider an experiment with events A and B such that $P(A) = 0.26$, $P(B) = 0.68$ and $P(A \cup B) = 0.80$. Find each of the following.
(a) $P(A')$ (b) $P(A \cap B)$ (c) $P([A \cap B]')$ (d) $P([A \cup B]')$ (e) $P(A|B)$ (f) $P(B|A)$
5. Suppose a bridge has 10 toll booths in the east-bound lane: four are for E-Z Pass holders, two are only for exact change, one takes only tokens, and the remainder are manned by toll collectors who only accept cash. During heavy-traffic hours it is difficult to see the signs indicating the type of toll booth. Suppose a driver selects a toll booth randomly. What is the probability that the driver selects
(a) an exact-change toll booth?
(b) a toll booth for manual-collection or tokens?
(c) a booth that is not for E-Z pass?
6. A tire manufacturer has started a program to monitor production. In every batch of twenty tires, two will be randomly selected and tested for defects electronically. An experiment consists of recording the condition of these two tires: defect or no-defect. Suppose four of the twenty tires in a batch actually have a defect. What is the probability that exactly one tire selected will have a defect?

7. (a) How many ways can 3-course meal be selected if you can choose from 5 appetizers, 8 entrees, and 4 desserts?
- (b) How many ways can exactly 3 out of a group of 7 people be selected to attend a meeting?
- (c) How many ways can an executive committee of president, vice president, secretary, and treasurer be selected from a club of 30 members?
8. The dreaded illness “Mathitis” requires both a blood test and an eye test for diagnosis. The blood test accurately detects mathitis with probability 0.67 and the eye test accurately detects mathitis with probability 0.28. What is the probability that *at least one* of the tests accurately detects mathitis if (a) the test results are mutually exclusive, (b) the test results are independent, (c) the probability both tests are correct is 0.14?
9. Majors for men and women in business. To study the career plans of young women and men, questionnaires were sent to all 722 members of the senior class in the college of business administration at a large university. One question asked which major within the business program the student had chosen. Here are the data from the students who responded:

Career	Female	Male	total
Accounting	68	56	124
Administration	91	40	131
Economics	5	6	11
Finance	61	59	120
total	225	161	386

- (a) What is the probability that a randomly selected student is
 - (i) female
 - (ii) female and in accounting
 - (iii) not in accounting
 - (iv) in accounting, given that the student is female
 - (v) in accounting or economics
 - (vi) female and not in accounting
- (b) Are the two events “being a female” and “being in accounting” independent, mutually exclusive or neither? Justify your answer with relevant probabilities.
10. Michelle likes to submit anecdotes to her favourite podcast. Of all her submissions, 10% of them are “drunk dials” and 90% are “overheards”. If her submission is an overheard, there is an 80% chance it will be played on the podcast. If it is a drunk dial, there is only a 15% chance it will be played.
 - (a) Draw a tree diagram to represent this problem.
 - (b) What is the probability that she submits a drunk dial and it is not played on the podcast?
 - (c) What is the probability her submission is played?
 - (d) Last week, Michelle’s submission was played on the podcast. What is the probability that her submission was an overheard?