

Practice Multiple Choice and Free Response

1. Given two events, E and F, such that $P(E) = .340$, $P(F) = .450$, and $P(E \cup F) = .637$, then the two events are

- (a) Independent and mutually exclusive
- (b) Neither independent nor mutually exclusive
- (c) Independent, but not mutually exclusive
- (d) Mutually exclusive, but not independent
- (e) There is not enough information to answer question.

2. Suppose that the probabilities that an answer can be found on Google is 0.95, on Answers.com is 0.92, and on both sites is 0.874. Are the possibilities of finding an answer on the two Web sites independent?

- a) Yes, because $(.95)(.92) = .874$
- b) No, because $(.95)(.92) = .874$
- c) Yes, because $.95 > .92 > .874$.
- d) No, because $.95 + .92 \neq .874$
- e) There is insufficient information to answer this question.

3. The following is from a particular region's mortality table.

Age	0	20	40	60	80
Number Surviving	10,000	9,700	9,240	7,800	4,300

What is the probability that a 20-year-old will survive to be 60?

- a) .1959
- b) .4419
- c) .7800
- d) .8401
- e) .9700

4. It is estimated that 20 percent of all drivers do not signal when changing lanes. In a random sample of four drivers, what is the probability that at least one driver does not signal when changing lanes?

- a) $1 - (.2)^4$
- b) $1 - (.8)^4$
- c) $4(.2)(.8)^3$
- d) $4(.2)^3(.8)$
- e) $.2^4$

5. According to one poll, only 8 percent of the public say they "trust Congress." In a simple random sample of ten people, what is the probability that at least one person "trusts Congress"?

- a) 0.188
- b) 0.378
- c) 0.434
- d) 0.566
- e) 0.622

6. Dr. Stats plans to toss a fair coin 10,000 times in the hope it will lead him to a deeper understanding of the laws of probability. Which of the following statement is true?

- a) It is unlikely that he will get more than 5000 heads.
- b) Whenever he gets a string of 15 tails in a row, it becomes more likely that the next toss will be a head.
- c) The fraction of tosses resulting in heads should be close to $\frac{1}{2}$.
- d) The chance that the 100th toss will be a head depends somewhat on the results of the first 99 tosses.
- e) All of the above statements are true.

7. A deck of playing cards has 52 cards, of which 12 are face cards. If you shuffle the deck well and turn over the top 3 cards, one after the other, what is the probability that all 3 are face cards?

- a) 0.001
- b) 0.005
- c) 0.010
- d) 0.012
- e) 0.02

8. You read in a book on poker that the probability of being dealt three of a kind in a five-card poker hand is $\frac{1}{50}$. What does this mean?

- A. If you deal thousands of poker hands, the fraction of them that contain three of a kind will be very close to $\frac{1}{50}$.
- B. If you deal 50 poker hands, then one of them will contain three of a kind.
- C. If you deal 10,000 poker hands, then 200 of them will contain three of a kind.
- D. A probability of 0.02 is somebody's best guess for a probability of being dealt three of a kind.
- E. It doesn't mean anything, because $\frac{1}{50}$ is just a number.

9. A basketball player makes 75% of his free throws. We want to estimate the probability that he makes 4 or more free throws out of 5 attempts (we assume the shots are independent). To do this, we use the digits 1, 2, and 3 to correspond to making the free throw and the digit 4 to correspond to missing the free throw. If the table of random digits begins with the digits below, how many free throws does he hit in our first simulation of five shots?

19223 95034 58301

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

10. A game consists of drawing three cards at random from a deck of playing cards. You win \$3 for each red card that is drawn. It costs \$2 to play. For one play of this game, the sample space S for the net amount you win (after deducting the cost of play) is

- A. $S = \{\$0, \$1, \$2, \$3\}$ B. $S = \{-\$6, -\$3, \$0, \$6\}$ C. $S = \{-\$2, \$1, \$4, \$7\}$
 D. $S = \{-\$2, \$3, \$6, \$9\}$ E. $S = \{\$0, \$3, \$6, \$9\}$

11. A stack of four cards contains two red cards and two black cards. I select two cards, one at a time, and do *not* replace the first card selected before selecting the second card. Consider the events

A = the first card selected is red B = the second card selected is red

The events A and B are

- A. independent and disjoint. B. not independent, but disjoint.
 C. independent, not disjoint D. not independent, not disjoint.
 E. independent, but we can't tell it's disjoint without further information.

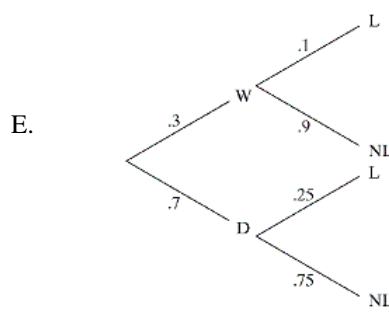
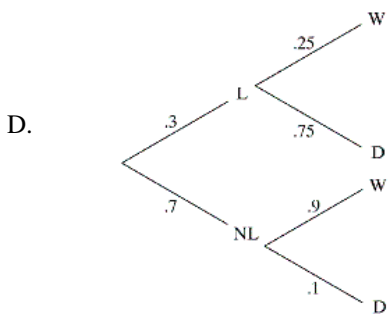
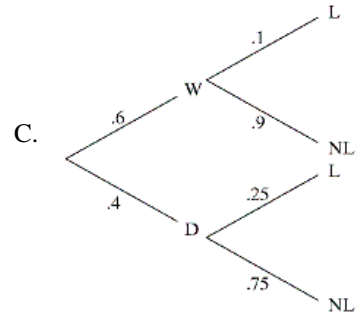
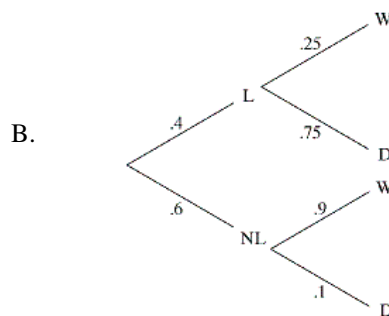
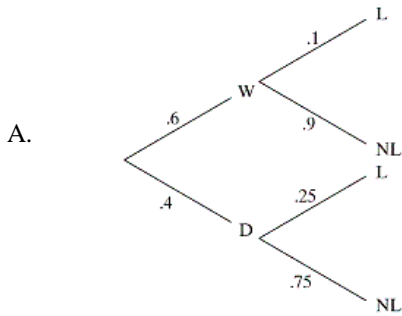
12. In a certain town, 60% of the households have broadband internet access, 30% have at least one high-definition television, and 20% have both. The proportion of households that have neither broadband internet nor high-definition television is:

- A. 0%. B. 10%. C. 30%. D. 80%. E. 90%.

13. Event A occurs with probability 0.8. The conditional probability that event B occurs, given that A occurs, is 0.5. The probability that both A and B occur

- A. is 0.3. B. is 0.4. C. is 0.625. D. is 0.8.
 E. cannot be determined from the information given.

14. Each day, Mr. Bayona chooses a one-digit number from a random number table to decide if he will walk to work or drive that day. The numbers 0 through 3 indicate he will drive, 4 through 9 mean he will walk. If he drives, he has a probability of 0.1 of being late. If he walks, his probability of being late rises to 0.25. Let W = Walk, D = Drive, L = Late, and NL = Not Late. Which of the following tree diagrams summarizes these probabilities?



The following table compares the hand dominance of 200 Canadian high-school students and what methods they prefer using to communicate with their friends.

	Cell phone/Text	In person	Online	Total
Left-handed	12	13	9	34
Right-handed	43	72	51	166
Total	55	85	60	200

Suppose one student is chosen randomly from this group of 200. (Answer questions 15-17)

15. What is the probability that the student chosen is left-handed or prefers to communicate with friends in person?
 A. 0.065 B. 0.17 C. 0.425 D. 0.53 E. 0.595

16. If you know the person that has been randomly selected is left-handed, what is the probability that they prefer to communicate with friends in person?
 A. 0.065 B. 0.153 C. 0.17 D. 0.382 E. 0.53

17. Which of the following statements supports the conclusion that the event “Right-handed” and the event “Online” are not independent?

- A. $\frac{51}{200} \neq \frac{34}{60}$ B. $\frac{9}{34} \neq \frac{166}{200}$ C. $\frac{166}{200} \neq \frac{60}{200}$ D. $\frac{60}{166} \neq \frac{166}{200}$ E. $\frac{51}{60} \neq \frac{166}{200}$

Free Response

18. A company’s human resources officer reports a breakdown of employees by job type and sex shown in the table.

	Male	Female
Management	7	6
Supervision	8	12
Production	45	72

- a) What is the probability that a worker selected at random is
 i) female?
 ii) female or a production worker?
 iii) female, if the person works in production?
 iv) a production worker, if the person is female?
 b) Do these data suggest that job type is independent of being male or female? Explain.

19. Safety engineers must determine whether industrial workers can operate a machine’s emergency shutoff device. Among a group of test subjects, 66% were successful with their left hands, 82% with their right hands, and 51% with either hand.

- a) What percent of these workers could not operate the switch with either hand?
 b) Are success with right and left hands independent events? Explain.
 c) Are success with right and left hands mutually exclusive? Explain.

20. A local college offers two sections of Statistics 101. From what has been said about the two professors, a student estimates their chances of passing the course are 0.80 if she gets Professor Doolittle and 0.60 if she gets Professor Doolots. The registrar uses a lottery to randomly assign 120 enrolled students based on the number of available seats in each class. There are 70 seats in Professor Doolittle’s class and 50 in Professor Doolots’ class.

- a) What is the probability that the student will pass Statistics 101?
 b) At the end of the semester, we find out that the student failed. What is the probability that the student got Professor Doolots’?

22. From police records, it has been determined that 15% of drivers stopped for routine license checks are not wearing seat belts. If a police officer stops 10 vehicles, how likely is it that two consecutive drivers won't be wearing their seat belts?

a) Describe the design of a simulation to estimate this probability. Explain clearly how you will use the partial table of random digits below to carry out your simulation.

b) Carry out **three** repetitions of the simulation. Mark on or directly above the table to show your results.

29077	14863	61683	47052	62224	51025
95052	90908	73592	75186	87136	95761
27102	56027	55892	33063	41842	81868
43367	49497	72719	96758	27611	91596

23. A census by the county dog control officer found that 18% of homes kept one dog as a pet, 4% had two dogs and 1% had three or more. If a salesman visits two homes selected at random, what is the probability he encounters

a) no dogs?

b) some dogs?

c) dogs in each home?

d) more than one dog in each home?

24. In a car rental company's fleet, 70% of the cars are American brands, 20% are Japanese, and the rest are German. The company notes that manufacturers' recalls seem to affect 2% of the American cars, but only 1% of the others.

a) What is the probability that a randomly selected chosen car is recalled?

b) What is the probability that a recalled car is American?