The following exercises are to be completed **INDIVIDUALLY**, then discussed within your assigned group. Group copies are due **March 16, 2018**

Liar, liar! Sometimes police use a lie detector (also known as a polygraph) to help determine whether a suspect is telling the truth. A lie detector test isn't foolproof—sometimes it suggests that a person is lying when he or she is actually telling the truth (a "false positive"). Other times, the test says that the suspect is being truthful when the person is actually lying (a "false negative"). For one brand of polygraph machine, the probability of
1. a false positive is 0.08.

- **(a)** Interpret this probability as a long-run relative frequency.
- **(b)** Which is a more serious error in this case: a false positive or a false negative? Justify your answer.

Texas hold 'em In the popular Texas hold 'em variety of poker, players make their best five-card poker hand by combining the two cards they are dealt with three of five cards available to all players. You read in a book on poker that if you hold a pair (two cards of the same rank) in your hand, the probability of getting four of a kind is 88/1000.
4.

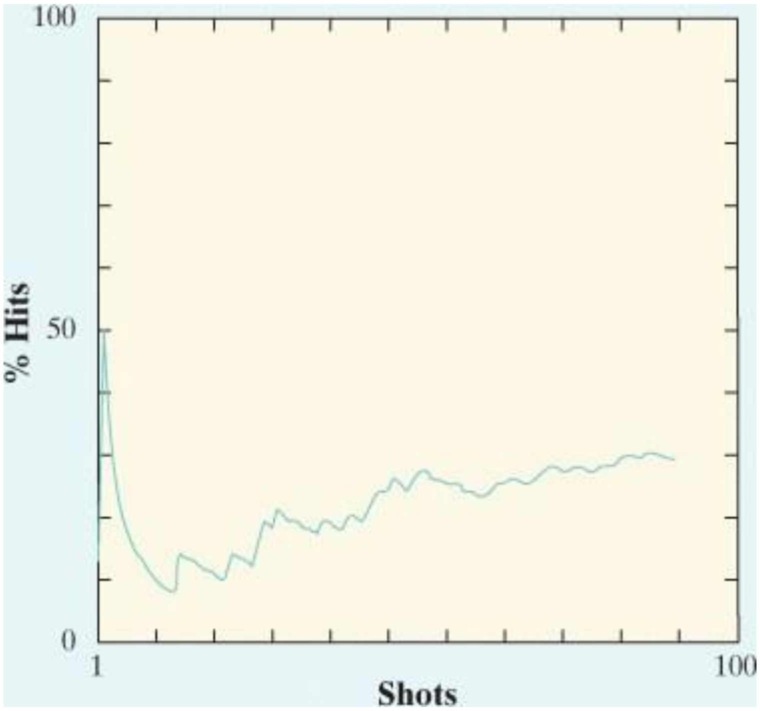
- **(a)** Explain what this probability means.
- **(b)** If you play 1000 such hands, will you get four of a kind in exactly 88 of them? Explain.

Spinning a quarter With your forefinger, hold a new quarter (with a state featured on the reverse) upright, on its edge, on a hard surface. Then flick it with your other forefinger so that it spins for some time before it falls and comes to rest. Spin the coin a total of 25 times,
5. and record the results.

(a) What's your estimate for the probability of heads? Why?

(b) Explain how you could get an even better estimate.

Free throws The figure below shows the results of a virtual basketball player shooting several free throws. Explain what this graph says about chance behavior in the short run and
7. long run.



Due for a hit A very good professional baseball player gets a hit about 35% of the time over

9. an entire season. After the player failed to hit safely in six straight at-bats, a TV commentator said, “He is due for a hit by the law of averages.” Is that right? Why?

An unenlightened gambler

- **(a)** A gambler knows that red and black are equally likely to occur on each spin of a roulette wheel. He observes five consecutive reds occur and bets heavily on black at the next spin. Asked why, he explains that black is “due by the law of averages.”

12. Explain to the gambler what is wrong with this reasoning.

- **(b)** After hearing you explain why red and black are still equally likely after five reds on the roulette wheel, the gambler moves to a poker game. He is dealt five straight red cards. He remembers what you said and assumes that the next card dealt in the same hand is equally likely to be red or black. Is the gambler right or wrong, and why?

Stoplight On her drive to work every day, Ilana passes through an intersection with a traffic light. The light has probability 1/3 of being green when she gets to the intersection. Explain how you would use each chance device to simulate whether the light is red or green on a given day.

14. - **(a)** A six-sided die
- **(b)** Table D of random digits
- **(c)** A calculator or computer’s random integer generator

15. **Simulation blunders** Explain what's wrong with each of the following simulation designs.

- **(a)** A roulette wheel has 38 colored slots—18 red, 18 black, and 2 green. To simulate one spin of the wheel, let numbers 00 to 18 represent red, 19 to 37 represent black, and 38 to 40 represent green.
- **(b)** About 10% of U.S. adults are left-handed. To simulate randomly selecting one adult at a time until you find a left-hander, use two digits. Let 00 to 09 represent being left-handed and 10 to 99 represent being right-handed. Move across a row in Table D, two digits at a time, skipping any numbers that have already appeared, until you find a number between 00 and 09. Record the number of people selected.

16. **Simulation blunders** Explain what's wrong with each of the following simulation designs.

- **(a)** According to the Centers for Disease Control and Prevention, about 36% of U.S. adults were obese in 2012. To simulate choosing 8 adults at random and seeing how many are obese, we could use two digits. Let 00 to 35 represent obese and 36 to 99 represent not obese. Move across a row in Table D, two digits at a time, until you find 8 distinct numbers (no repeats). Record the number of obese people selected.
- **(b)** Assume that the probability of a newborn being a boy is 0.5. To simulate choosing a random sample of 9 babies who were born at a local hospital today and observing their gender, use one digit. Use randInt(0,9) on your calculator to determine how many babies in the sample are male.

17. **Is this valid?** Determine whether each of the following simulation designs is valid. Justify your answer.

- **(a)** According to a recent poll, 75% of American adults regularly recycle. To simulate choosing a random sample of 100 U.S. adults and seeing how many of them recycle, roll a 4-sided die 100 times. A result of 1, 2, or 3 means the person recycles; a 4 means that the person doesn't recycle.
- **(b)** An archer hits the center of the target with 60% of her shots. To simulate having her shoot 10 times, use a coin. Flip the coin once for each of the 10 shots. If it lands heads, then she hits the center of the target. If the coin lands tails, she doesn't.

19. **Airport security** The Transportation Security Administration (TSA) is responsible for airport safety. On some flights, TSA officers randomly select passengers for an extra security check prior to boarding. One such flight had 76 passengers—12 in first class and 64 in coach class. Some passengers were surprised when none of the 10 passengers chosen for screening were seated in first class. We can use a simulation to see if this result is likely to happen by chance.

- **(a)** State the question of interest using the language of probability.
- **(b)** How would you use random digits to imitate one repetition of the process? What variable would you measure?
- **(c)** Use the line of random digits below to perform one repetition. Copy these digits onto your paper. Mark directly on or above them to show how you determined the outcomes of the chance process.

  71487 09984 29077 14863 61683 47052 62224 51025

- **(d)** In 100 repetitions of the simulation, there were 15 times when none of the 10 passengers chosen was seated in first class. What conclusion would you draw?

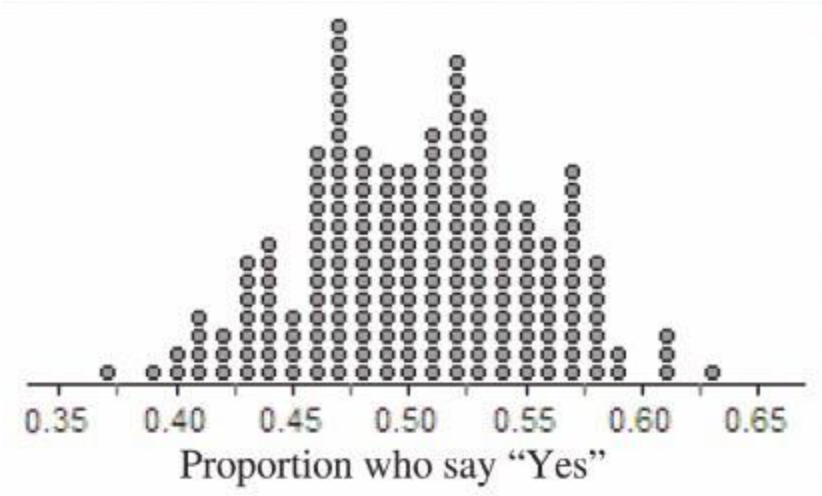
Monty Hall problem In *Parade* magazine, a reader posed the following question to Marilyn vos Savant and the "Ask Marilyn" column:

Suppose you're on a game show, and you're given the choice of three doors. Behind one door is a car, behind the others, goats. You pick a door, say #1, and the host, who knows what's behind the doors, opens another door, say #3, which has a goat. He says to you, "Do you want to pick door #2?" Is it to your advantage to switch your choice of doors?[4] **22.** The game show in question was *Let's Make a Deal* and the host was Monty Hall. Here's the first part of Marilyn's response: "Yes; you should switch. The first door has a 1/3 chance of winning, but the second door has a 2/3 chance." Thousands of readers wrote to Marilyn to disagree with her answer. But she held her ground.

- **(a)** Use an online *Let's Make a Deal* applet to perform at least 50 repetitions of the simulation. Record whether you stay or switch (try to do each about half the time) and the outcome of each repetition.
- **(b)** Do you agree with Marilyn or her readers? Explain.

Recycling Do most teens recycle? To find out, an AP® Statistics class asked an SRS of 100 students at their school whether they regularly recycle. In the sample, 55 students said that they recycle. Is this convincing evidence that more than half of the students at the school

23. would say they regularly recycle? The Fathom dotplot below shows the results of taking 200 SRSs of 100 students from a population in which the true proportion who recycle is 0.50.



- **(a)** Explain why the sample result does not give convincing evidence that more than half of the school's students recycle.
- **(b)** Suppose instead that 63 students in the class's sample had said "Yes." Explain why this result would give strong evidence that a majority of the school's students recycle.

25. **Color-blind men** About 7% of men in the United States have some form of red-green color blindness. Suppose we randomly select 4 U.S. adult males. What's the probability that at least one of them is red-green color-blind? Design and carry out a simulation to answer this question. Follow the four-step process.

Multiple choice: Select the best answer for Exercises 31 to 36.

31. You read in a book about bridge that the probability that each of the four players is dealt exactly one ace is about 0.11. This means that

- **(a)** in every 100 bridge deals, each player has one ace exactly 11 times.
- **(b)** in 1 million bridge deals, the number of deals on which each player has one ace will be exactly 110,000.
- **(c)** in a very large number of bridge deals, the percent of deals on which each player has one ace will be very close to 11%.
- **(d)** in a very large number of bridge deals, the average number of aces in a hand will be very close to 0.11.
- **(e)** If each player gets an ace in only 2 of the first 50 deals, then each player should get an ace in more than 11% of the next 50 deals.

If I toss a fair coin five times and the outcomes are TTTTT, then the probability that tails appears on the next toss is

32.

- **(a)** 0.5.
- **(b)** less than 0.5.
- **(c)** greater than 0.5.
- **(d)** 0. **(e)** 1.

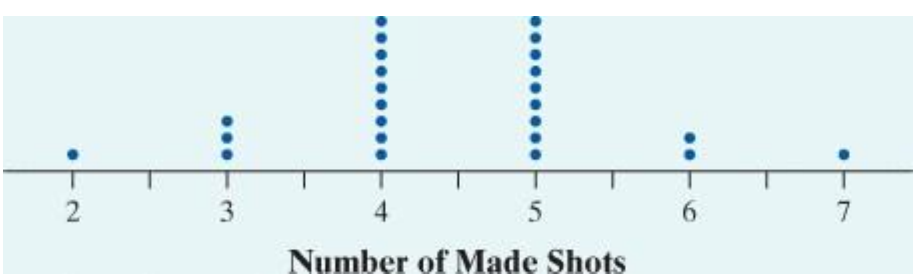
Exercises 33 to 35 refer to the following setting. A basketball player claims to make 47% of her shots from the field. We want to simulate the player taking sets of 10 shots, assuming that her claim is true.

To simulate the number of makes in 10 shot attempts, you would perform the simulation as follows:

33.

- **(a)** Use 10 random one-digit numbers, where 0–4 are a make and 5–9 are a miss.
- **(b)** Use 10 random two-digit numbers, where 00–46 are a make and 47–99 are a miss.
- **(c)** Use 10 random two-digit numbers, where 00–47 are a make and 48–99 are a miss.
- **(d)** Use 47 random one-digit numbers, where 0 is a make and 1–9 are a miss.
- **(e)** Use 47 random two-digit numbers, where 00–46 are a make and 47–99 are a miss.

Twenty-five repetitions of the simulation were performed. The simulated number of makes in each set of 10 shots was recorded on the dotplot below. What is the approximate probability that a 47% shooter makes 5 or more shots in 10 attempts?



34.

- **(a)** 5/10
- **(b)** 3/10

- **(c)** 12/25
- **(d)** 3/25
- **(e)** 47/100

Suppose this player attempts 10 shots in a game and only makes 3 of them. Does this provide convincing evidence that she is less than a 47% shooter?

- **(a)** Yes, because 3/10 (30%) is less than 47%.

35.

- **(b)** Yes, because she never made 47% of her shots in the simulation.
- **(c)** No, because it is plausible that she would make 3 or fewer shots by chance alone.
- **(d)** No, because the simulation was only repeated 25 times.
- **(e)** No, because the distribution is approximately symmetric.

Ten percent of U.S. households contain 5 or more people. You want to simulate choosing a household at random and recording "Yes" if it contains 5 or more people. Which of these are correct assignments of digits for this simulation?

36.

- **(a)** Odd = Yes; Even = No
- **(b)** 0 = Yes; 1–9 = No
- **(c)** 0–5 = Yes; 6–9 = No
- **(d)** 0–4 = Yes; 5–9 = No
- **(e)** None of these

Role-playing games Computer games in which the players take the roles of characters are very popular. They go back to earlier tabletop games such as Dungeons & Dragons. These games use many different types of dice. A four-sided die has faces with 1, 2, 3, and 4 spots.

39.

- **(a)** List the sample space for rolling the die twice (spots showing on first and second rolls).
- **(b)** What is the assignment of probabilities to outcomes in this sample space? Assume that the die is perfectly balanced.

41. **Role-playing games** Refer to Exercise 39. Define event A: sum is 5. Find $P(A)$.

Probability models? In each of the following situations, state whether or not the given assignment of probabilities to individual outcomes is legitimate, that is, satisfies the rules of probability. If not, give specific reasons for your answer.

- **(a)** Roll a 6-sided die and record the count of spots on the up-face: $P(1) = 0$, $P(2) = 1/6$, $P(3) = 1/3$, $P(4) = 1/3$, $P(5) = 1/6$, $P(6) = 0$.

43.

- **(b)** Choose a college student at random and record gender and enrollment status: *P*(female full-time) = 0.56, *P*(male full-time) = 0.44, *P*(female part-time) = 0.24, *P*(male part-time) = 0.17.
- **(c)** Deal a card from a shuffled deck: *P*(clubs) = 12/52, *P*(diamonds) = 12/52, *P*(hearts) = 12/52, *P*(spades) = 16/52.

Rolling a die The following figure displays several possible probability models for rolling a die. Some of the models are not *legitimate*. That is, they do not obey the rules. Which are legitimate and which are not? In the case of the illegitimate models, explain what is wrong.

44.

	Probability			
Outcome	Model 1	Model 2	Model 3	Model 4
⚀	1/7	1/3	1/3	1
⚁	1/7	1/6	1/6	1
⚂	1/7	1/6	1/6	2
⚃	1/7	0	1/6	1
⚄	1/7	1/6	1/6	1
⚅	1/7	1/6	1/6	2

Languages in Canada Canada has two official languages, English and French. Choose a Canadian at random and ask, "What is your mother tongue?" Here is the distribution of responses, combining many separate languages from the broad Asia/Pacific region:[7]

Language:	English	French	Asian/Pacific	Other
Probability:	0.63	0.22	0.06	?

46.

- **(a)** What probability should replace "?" in the distribution? Why?
- **(b)** What is the probability that a Canadian's mother tongue is not English?

- **(c)** What is the probability that a Canadian's mother tongue is a language other than English or French?

Preparing for the GMAT A company that offers courses to prepare students for the Graduate Management Admission Test (GMAT) has the following information about its customers: 20% are currently undergraduate students in business; 15% are undergraduate students in other fields of study; 60% are college graduates who are currently employed; and 5% are college graduates who are not employed. Choose a customer at random.

48.

- **(a)** What's the probability that the customer is currently an undergraduate? Which rule of probability did you use to find the answer?
- **(b)** What's the probability that the customer is not an undergraduate business student? Which rule of probability did you use to find the answer?

Who eats breakfast? Students in an urban school were curious about how many children regularly eat breakfast. They conducted a survey, asking, "Do you eat breakfast on a regular basis?" All 595 students in the school responded to the survey. The resulting data are shown in the two-way table below.[8]

	Male	Female	Total
Eats breakfast regularly	190	110	**300**
Doesn't eat breakfast regularly	130	165	**295**
Total	**320**	**275**	**595**

49.

If we select a student from the school at random, what is the probability that the student is

- **(a)** a female?
- **(b)** someone who eats breakfast regularly?
- **(c)** a female and eats breakfast regularly? ▯ **(d)** a female or eats breakfast regularly?

Playing cards Shuffle a standard deck of playing cards and deal one card. Define events *J*: getting a jack, and *R*: getting a red card.

- **(a)** Construct a two-way table that describes the sample space in terms of events *J*

52. and R.

- **(b)** Find $P(J)$ and $P(R)$.
- **(c)** Describe the event "J and R" in words. Then find $P(J \text{ and } R)$.
- **(d)** Explain why $P(J \text{ or } R) \neq P(J) + P(R)$. Then use the general addition rule to compute $P(J \text{ or } R)$.

Who eats breakfast? Refer to Exercise 49.

53. **(a)** Construct a Venn diagram that models the chance process using events B: eats breakfast regularly, and M: is male.

- **(b)** Find $P(B \cup M)$. Interpret this value in context.
- **(c)** Find $P(B^C \cap M^C)$. Interpret this value in context.

Facebook versus YouTube A recent survey suggests that 85% of college students have posted a profile on Facebook, 73% use YouTube regularly, and 66% do both. Suppose we select a college student at random.

- **(a)** Make a two-way table for this chance process.

55. **(b)** Construct a Venn diagram to represent this setting.

- **(c)** Consider the event that the randomly selected college student has posted a profile on Facebook or uses YouTube regularly. Write this event in symbolic form based on your Venn diagram in part (b).
- **(d)** Find the probability of the event described in part (c). Explain your method.

Multiple choice: Select the best answer for Exercises 57 to 60.

In government data, a household consists of all occupants of a dwelling unit. Choose an American household at random and count the number of people it contains. Here is the assignment of probabilities for the outcome:

Number of persons:	1	2	3	4	5	6	7+
Probability:	0.25	0.32	???	???	0.07	0.03	0.01

57. The probability of finding 3 people in a household is the same as the probability of finding 4 people. These probabilities are marked ??? in the table of the distribution. The probability that a household contains 3 people must be

- **(a)** 0.68.
- **(b)** 0.32. **(c)** 0.16.
- **(d)** 0.08.

- **(e)** between 0 and 1, and we can say no more.

In a sample of 275 students, 20 say they are vegetarians. Of the vegetarians, 9 eat both fish and eggs, 3 eat eggs but not fish, and 7 eat neither. Choose one of the vegetarians at random. What is the probability that the chosen student eats fish or eggs?

58.
- **(a)** 9/20
- **(b)** 13/20
- **(c)** 22/20
- **(d)** 9/275
- **(e)** 22/275

Exercises 59 and 60 refer to the following setting. The casino game craps is based on rolling two dice. Here is the assignment of probabilities to the sum of the numbers on the up-faces when two dice are rolled:

Outcome:	2	3	4	5	6	7	8	9	10	11	12
Probability:	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

The most common bet in craps is the "pass line." A pass line bettor wins immediately if either a 7 or an 11 comes up on the first roll. This is called a *natural*. What is the probability of a natural?

59.
- **(a)** 2/36
- **(b)** 6/36
- **(c)** 8/36
- **(d)** 12/36
- **(e)** 20/36

If a player rolls a 2, 3, or 12, it is called *craps*. What is the probability of getting craps or an even sum on one roll of the dice?

- **(a)** 4/36

60.
- **(b)** 18/36
- **(c)** 20/36
- **(d)** 22/36
- **(e)** 32/36

A *Titanic* disaster In 1912 the luxury liner *Titanic*, on its first voyage across the Atlantic, struck an iceberg and sank. Some passengers got off the ship in lifeboats, but many died. The two-way table gives information about adult passengers who lived and who died, by class of travel. Suppose we choose an adult passenger at random.

	Survival Status	
Class of Travel	Survived	Died
First class	197	122
Second class	94	167
Third class	151	476

64.

- **(a)** Given that the person selected was in first class, what's the probability that he or she survived?
- **(b)** If the person selected survived, what's the probability that he or she was a thirdclass passenger?

Sampling senators The two-way table describes the members of the U.S. Senate in a recent year. Suppose we select a senator at random. Consider events *D*: is a democrat, and *F*: is female.

	Male	Female
Democrats	47	13
Republicans	36	4

65.

- **(a)** Find $P(D \mid F)$. Explain what this value means.
- **(b)** Find $P(F \mid D)$. Explain what this value means.

Foreign-language study Choose a student in grades 9 to 12 at random and ask if he or she is studying a language other than English. Here is the distribution of results:

Language:	Spanish	French	German	All others	None
Probability:	0.26	0.09	0.03	0.03	0.59

67.

- **(a)** What's the probability that the student is studying a language other than English?

- **(b)** What is the conditional probability that a student is studying Spanish given that he or she is studying some language other than English?

Income tax returns Here is the distribution of the adjusted gross income (in thousands of dollars) reported on individual federal income tax returns in a recent year:

68.

Income:	<25	25–49	50–99	100–499	≥500
Probability:	0.431	0.248	0.215	0.100	0.006

- **(a)** What is the probability that a randomly chosen return shows an adjusted gross income of $50,000 or more?
- **(b)** Given that a return shows an income of at least $50,000, what is the conditional probability that the income is at least $100,000?

Tall people and basketball players Select an adult at random. Define events T: person is over 6 feet tall, and B: person is a professional basketball player. Rank the following 69. probabilities from smallest to largest. Justify your answer.

$$P(T) \quad P(B) \quad P(T \mid B) \quad P(B \mid T)$$

71.

Facebook versus YouTube A recent survey suggests that 85% of college students have posted a profile on Facebook, 73% use YouTube regularly, and 66% do both. Suppose we select a college student at random and learn that the student has a profile on Facebook. Find the probability that the student uses YouTube regularly. Show your work.

Mac or PC? A recent census at a major university revealed that 40% of its students mainly used Macintosh computers (Macs). The rest mainly used PCs. At the time of the census, 67% of the school's students were undergraduates. The rest were graduate students. In the
72. census, 23% of the respondents were graduate students who said that they used PCs as their primary computers. Suppose we select a student at random from among those who were part of the census and learn that the student mainly uses a PC. Find the probability that this person is a graduate student. Show your work.

Free downloads? Illegal music downloading has become a big problem: 29% of Internet users download music files, and 67% of downloaders say they don't care if the music is 73. copyrighted.[17] What percent of Internet users download music and don't care if it's copyrighted? Write the information given in terms of probabilities, and use the general multiplication rule.

Box of chocolates According to Forrest Gump, "Life is like a box of chocolates. You never know what you're gonna get." Suppose a candy maker offers a special "Gump box" with 20 chocolate candies that look the same. In fact, 14 of the candies have soft centers and 6 have hard centers. Choose 2 of the candies from a Gump box at random.

75.

- **(a)** Draw a tree diagram that shows the sample space of this chance process.
- **(b)** Find the probability that one of the chocolates has a soft center and the other one doesn't.

Urban voters The voters in a large city are 40% white, 40% black, and 20% Hispanic. (Hispanics may be of any race in official statistics, but here we are speaking of political blocks.) A mayoral candidate anticipates attracting 30% of the white vote, 90% of the black vote, and 50% of the Hispanic vote. Suppose we select a voter at random.

78.

- **(a)** Draw a tree diagram to represent this situation.
- **(b)** Find the probability that this voter votes for the mayoral candidate. Show your work.
- **(c)** Given that the chosen voter plans to vote for the candidate, find the probability that the voter is black. Show your work.

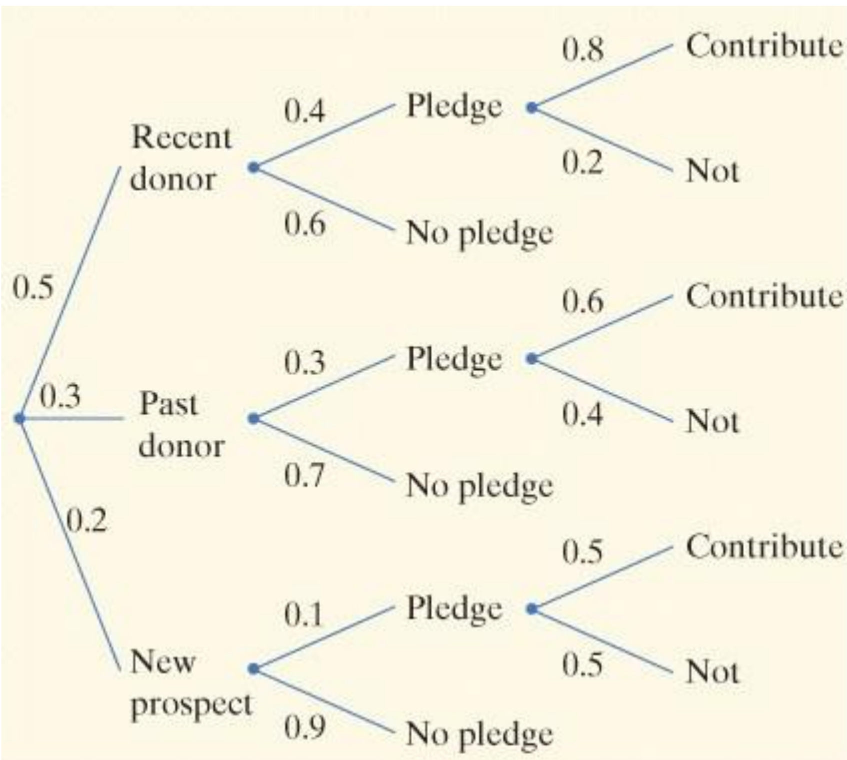
Lactose intolerance Lactose intolerance causes difficulty in digesting dairy products that contain lactose (milk sugar). It is particularly common among people of African and Asian ancestry. In the United States (ignoring other groups and people who consider themselves to **79.** belong to more than one race), 82% of the population is white, 14% is black, and 4% is Asian. Moreover, 15% of whites, 70% of blacks, and 90% of Asians are lactose intolerant.[19] Suppose we select a U.S. person at random.

- **(a)** What is the probability that the person is lactose intolerant? Show your work.

□

(b) Given that the person is lactose intolerant, find the probability that he or she is Asian. Show your work.

Fundraising by telephone Tree diagrams can organize problems having more than two stages. The figure at top right shows probabilities for a charity calling potential donors by telephone.[20] Each person called is either a recent donor, a past donor, or a new prospect. At the next stage, the person called either does or does not pledge to contribute, with conditional probabilities that depend on the donor class to which the person belongs. Finally, those who make a pledge either do or don't actually make a contribution. Suppose we randomly select a person who is called by the charity.



80.

- (a) What is the probability that the person contributed to the charity? Show your work.
- **(b)** Given that the person contributed, find the probability that he or she is a recent donor. Show your work.

82. **Testing the test** Are false positives too common in some medical tests? Researchers conducted an experiment involving 250 patients with a medical condition and 750 other patients who did not have the medical condition. The medical technicians who were reading the test results were unaware that they were subjects in an experiment.

- **(a)** Technicians correctly identified 240 of the 250 patients with the condition. They also identified 50 of the healthy patients as having the condition. What were the false positive and false negative rates for the test?
  (b) Given that a patient got a positive test result, what is the probability that the patient actually had the medical condition? Show your work.

84. **A *Titanic* disaster** Refer to Exercise 64.

- **(a)** Find $P(\text{survived} \mid \text{second class})$.
- **(b)** Find $P(\text{survived})$.
- **(c)** Use your answers to (a) and (b) to determine whether the events "survived" and "second class" are independent. Explain your reasoning.

85. **Sampling senators** Refer to Exercise 65. Are events D and F independent? Justify your answer.

86. **Who eats breakfast?** Refer to Exercise 66. Are events B and M independent? Justify your answer.

88. **Rolling dice** Suppose you roll two fair, six-sided dice—one red and one green. Are the events "sum is 8" and "green die shows a 4" independent? Justify your answer.

89. **Bright lights?** A string of Christmas lights contains 20 lights. The lights are wired in series, so that if any light fails, the whole string will go dark. Each light has probability 0.02 of failing during a 3-year period. The lights fail independently of each other. Find the probability that the string of lights will remain bright for 3 years.

92. **Lost Internet sites** Internet sites often vanish or move, so that references to them can't be followed. In fact, 13% of Internet sites referenced in major scientific journals are lost within two years after publication.[22] If we randomly select seven Internet references, from scientific journals, what is the probability that at least one of them doesn't work two years later? **Late**

□

shows Some TV shows begin after their scheduled times when earlier programs run **93.** late. According to a network's records, about 3% of its shows start late. To find the probability that three consecutive shows on this network start on time, can we multiply (0.97)(0.97)(0.97)? Why or why not?

Show Answer

94. **Late flights** An airline reports that 85% of its flights arrive on time. To find the probability that its next four flights into LaGuardia Airport all arrive on time, can we multiply (0.85)(0.85)(0.85)(0.85)? Why or why not?

Multiple choice: Select the best answer for Exercises 97 to 99.

97. An athlete suspected of using steroids is given two tests that operate independently of each other. Test A has probability 0.9 of being positive if steroids have been used. Test B has probability 0.8 of being positive if steroids have been used. What is the probability that neither test is positive if steroids have been used?

- **(a)** 0.72
- **(b)** 0.38
- **(c)** 0.02
- **(d)** 0.08
- **(e)** 0.28

98. In an effort to find the source of an outbreak of food poisoning at a conference, a team of medical detectives carried out a study. They examined all 50 people who had food poisoning and a random sample of 200 people attending the conference who didn't get food poisoning. The detectives found that 40% of the people with food poisoning went to a cocktail party on the second night of the conference, while only 10% of the people in the random sample attended the same party. Which of the following statements is appropriate for describing the 40% of people who went to the party? (Let F = got food poisoning and A = attended party.)

- **(a)** $P(F \mid A) = 0.40$
- **(b)** $P(A \mid F^C) = 0.40$
- **(c)** $P(F \mid A^C) = 0.40$
- **(d)** $P(A^C \mid F) = 0.40$
- **(e)** $P(A \mid F) = 0.40$

Suppose a loaded die has the following probability model:

Outcome:	1	2	3	4	5	6
Probability:	0.3	0.1	0.1	0.1	0.1	0.3

99. If this die is thrown and the top face shows an odd number, what is the probability that the die shows a 1?

- **(a)** 0.10
- **(b)** 0.17
- **(c)** 0.30
- **(d)** 0.50
- **(e)** 0.60