or Yx pair of chromosomes will have the disease and a child with XX or XY or YX or xX or Xx will not have the disease. Each parent contributes one of the chromosomes to the child.

a. If a father has the defective x chromosome and the mother has good XX chromosomes, what is the probability that a son will inherit the disease?

b. If a father has the defective x chromosome and the mother has good XX chromosomes, what is the probability that a daughter will inherit the disease?

c. If a mother has one defective x chromosome and one good X chromosome and the father has good XY chromosomes, what is the probability that a son will inherit the disease?

d. If a mother has one defective x chromosome and one good X chromosome and the father has good XY chromosomes, what is the probability that a daughter will inherit the disease?

4-2 Beyond the Basics

Odds. ***In Exercises 43–46, answer the given questions that involve odds.***

43. Texas Pick 3 In the Texas Pick 3 lottery, you can bet $1 by selecting the exact order of three digits between 0 and 9 inclusive, so the probability of winning is 1/1000. If the same three numbers are drawn in the same order, you collect $500, so your net profit is $499.

a. Find the actual odds against winning.

b. Find the payoff odds.

c. The web site www.txlottery.org indicates "Odds 1:1000" for this bet. Is that description accurate?

44. Finding Odds in Roulette A roulette wheel has 38 slots. One slot is 0, another is 00, and the others are numbered 1 through 36, respectively. You place a bet that the outcome is an odd number.

a. What is your probability of winning?

b. What are the actual odds against winning?

c. When you bet that the outcome is an odd number, the payoff odds are 1:1. How much profit do you make if you bet $18 and win?

d. How much profit would you make on the $18 bet if you could somehow convince the casino to change its payoff odds so that they are the same as the actual odds against winning? (*Recommendation:* Don't actually try to convince any casino of this; their sense of humor is remarkably absent when it comes to things of this sort.)

45. Kentucky Derby Odds When the horse Super Saver won the 136th Kentucky Derby, a $2 bet that Super Saver would win resulted in a return of $18.

a. How much net profit was made from a $2 win bet on Super Saver?

b. What were the payoff odds against a Super Saver win?

c. Based on preliminary wagering before the race, bettors collectively believed that Super Saver had a 0.093 probability of winning. Assuming that 0.093 was the true probability of a Super Saver victory, what were the actual odds against his winning?

d. If the payoff odds were the actual odds found in part (c), how much would a $2 win ticket be worth after the Super Saver win?

46. Finding Probability from Odds If the actual odds against event A are a:b, then $P(A) = b/(a + b)$. Find the probability of the horse Make Music for Me winning the 136th Kentucky Derby, given that the actual odds against his winning that race were 36:1.