

Review Exercises

1. A factory produces items in boxes of 2. Over the long run:
 - 92% of boxes contain 0 defective items;
 - 5% of boxes contain 1 defective item; and
 - 3% of boxes contain 2 defective items.

A box is picked at random from production, then an item is picked at random from the box. Given that the item is defective, what is the chance that the box is defective?

2. A box contains 1 black ball and 1 white ball. A ball is drawn at random from the box with an additional ball of the same color. Then a second ball is drawn at random from the three balls in the box. What is the probability that the second ball was white, given that at least one of the two balls drawn was white?
3. Suppose I toss three coins. Two of them at least must land the same way whether they land heads or tails, the third coin is equally likely to land the same way or oppositely. So the chance that all three coins land the same way is $\frac{1}{2}$. False? Explain!

- ✓ 4. There are two boxes.
 - Box 1 contains 2 red balls and 3 black balls.
 - Box 2 contains 8 red balls and 12 black balls.
 One of the two boxes is picked at random, and then a ball is picked from the box.
 - a) Is the color of the ball independent of which box is chosen?
 - b) What if there were 10 black balls rather than 12 in Box 2, but the same number of red balls? Would the answer be the same?

5. To pass a test you have to perform successfully two consecutive tasks, one hard and one easy. The easy task you think you can perform with probability h , where $h < 1$. The hard task you think you can perform with probability h , where $h < 1$. You can attempt the tasks in either order (easy, hard, easy) or in the order (hard, easy, hard). Whichever order, you must be successful twice in a row to pass. The two attempts are independent, in what order should you choose to attempt the tasks to maximize your probability of passing the test?

- ✓ 6. Show that if A and B are independent, then so are A^c and B , and A and B^c .

7. A population of 50 registered voters contains 30 in favor of Proposition 13 and 20 opposed. An opinion survey selects a random sample of 4 voters as follows. One person is picked at random from the 50 voters, then from the remaining 49, and so on, till 4 people have been picked.
 - a) What is the probability that there will be no one in favor of Proposition 13?
 - b) What is the probability that there will be at least one person in favor of Proposition 13?
 - c) What is the probability that exactly one person in favor of Proposition 13 will be picked?