STA101 Problem Set 3

Summer I, 2021, Duke University

Exercises from the OpenIntro book

Chapter 3 exercises 3.8 and 3.32.

Additional problems

Problem 3

If you flip a pair of fair dices, what is the probability of

(a) getting a sum of 2?

(b) getting a sum of 7?

(c) getting a sum of 13?

Problem 4

Refer to the introduction and data table in Exercise 3.18 (Page 111) and answer the following questions:

(a) What is the probability that a randomly chosen male respondent or his partner has brown eyes?

(b) What is the probability that a randomly chosen male respondent with blue eyes has a partner with brown eyes?

(c) What is the probability that a randomly chosen male respondent with brown eyes has a partner with brown eyes as well? What about the probability of a randomly chosen male respondent with green eyes having a partner with brown eyes?

(d) Does it appear that the eye colors of male respondents and their partners are independent? Explain your reasoning briefly.

Problem 5

Suppose we have an urn that contains 20 balls, among which 6 are red, 4 are orange, 7 are blue, and 3 are green. If we randomly pick 3 balls from this urn **without replacement**, what is the probability that one of the 3 balls is red and the other two are blue?

Problem 6

(Adapted from Exercise 3.44 on Page 130.)

Ice cream usually comes in 1.5 quart boxes (48 fluid ounces), and ice cream scoops hold about 2 ounces. However, there is some variability in the amount of ice cream in a box as well as the amount of ice cream scooped out. We represent the amount of ice cream in the box as X and the amount scooped out as Y . Suppose these random variables have the following means, standard deviations, and variances:

	mean	SD	variance
X	48	1.5	2.25
Y	2	0.3	0.09

(a) An entire box of ice cream, plus 4 scoops from a second box is served at a party. How much ice cream do you expect to have been served at this party? What is the standard deviation of the amount of ice cream served?

(b) How much ice cream would you expect to be left in the box after scooping out 2 scoops of ice cream? That is, find the expected value of $X - Y_1 - Y_2$, where Y_1 and Y_2 are the amount of the 1st and 2nd scoops, respectively. What is the standard deviation of the amount left in the box? (**Hint**: the 2 scoops are independent of each other, and so Y_1 and Y_2 are independent but both have the same mean, SD, and variance as Y.)

(c) Using the context of this exercise, explain why we add variances when we subtract one random variable from another.