

# 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 blue eyes? What about the probability of a randomly chosen male respondent with green eyes having a partner with blue 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  $X - 2Y$ . What is the standard deviation of the amount left in the box?
- (c) Using the context of this exercise, explain why we add variances when we subtract one random variable from another.