

Hints for Selected Exercises, HW #5

Assignment.

Chapter 4 problems, starting on p. 175:

Problems 1, 2, 7bc, 8bc, 10, 20, 21, 25, 35a.

Exercise 8b: For example, if X denotes the minimum value of the two rolls, then

$$P(X = 2) = \frac{|\{22,32,42,52,62,23,24,25,26\}|}{36} = \frac{9}{36} = \frac{1}{4} = 0.25.$$

Exercise 10: For example,

$$P(X = 2|X > 0) = \frac{P(X = 2 \text{ and } X > 0)}{P(X > 0)} = \frac{p(2)}{p(1) + p(2) + p(3)}.$$

Exercise 20: First of all, what are the possible values of X ? Well, if red appears on the first spin, then you win \$1 (you keep the \$1 you bet, and receive an additional \$1 for winning). So in this case $X = 1$ (in dollars). If not, then you lose the \$1 you bet, and place a \$1 bet on the next two spins. Then one of the following can happen:

- (a) You lose both spins. Then you lose two additional dollars, for a net loss of \$3.
- (b) You win exactly one of the next two spins. Then you win zero additional dollars, for a net loss of \$1.
- (c) You win both of the next two spins. Then you win two additional dollars, for a net gain of \$1.

So the possible values of X are $X = -3, -1, 1$. And note that $X = 1$ can happen in two different ways: either you win the first spin (and walk away), or you lose the first but win the next two.

Moreover, from the above analyses:

$$P(X = -3) = P(\text{lose all three spins});$$

$$P(X = -1) = P(\text{lose first and win either second or third});$$

$$P(X = 1) = P(\text{win first, or lose first and win second and third}).$$

You should be able to compute the relevant probabilities using the fact that the probability of winning a given spin is $18/38$.

Exercise 21: Please try to answer part (a) by reasoning it out before doing the computations for part (b).

For part (b), note, for example, that $P(X = 40) = 40/148$. (The probability that the randomly selected student is on the bus with 40 students is $40/148$, since there are 40 students on that bus and 148 students total.) Similarly, $P(Y = 40) = 1/4$. (The probability that the randomly selected bus driver is on the bus with 40 students is $1/4$, since we're selecting one of the four bus drivers at random.)

Exercise 25: For example,

$$\begin{aligned} &P(\text{exactly one head}) \\ &= P(\text{first is head and second is tails}) + P(\text{first is tails and second is heads}). \end{aligned}$$
