- Chapter 2 - Probability
  - Practice: 2.5, 2.7, 2.19, 2.29, 2.43
  - Graded: 2.6, 2.8, 2.20, 2.30, 2.38, 2.44

2.6

Dice rolls. If you roll a pair of fair dice, what is the probability of

(a) getting a sum of 1?

P(0)xP(1)+P(1)xP(0)

=0x1/6+1/6x0

=0

(b) getting a sum of 5?

P(1)xP(4)+P(4)xP(1)+P(2)xP(3)+P(3)xP(2)

=1/6 x 1/6 x4

=0.111

(c) getting a sum of 12?

P(6)xP(6)

=1/6 x 1/6

=0.027

2.8

Poverty and language. The American Community Survey is an ongoing survey that provides data every year to give communities the current information they need to plan investments and services. The 2010 American Community Survey estimates that 14.6% of Americans live below the poverty line, 20.7% speak a language other than English (foreign language) at home, and 4.2% fall into both categories.[59]

(a) Are living below the poverty line and speaking a foreign language at home disjoint?

P(both living below and speaking foreign language – disjoint)

= 1 – 4.2%

= 0.958

(b) Draw a Venn diagram summarizing the variables and their associated probabilities.

above poverty line — 85.4% | 4.2% | 79.3% — Speak English at Home — 95.8%
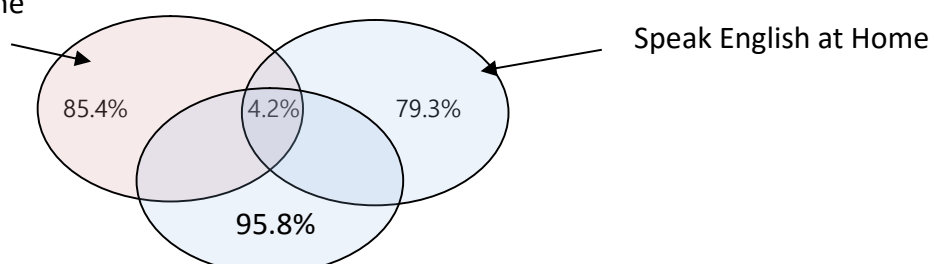
(c) What percent of Americans live below the poverty line and only speak English at home?

P(live below) and P(speak English)

=0.146 x 0.793

=0.116

=11.6%

(d) What percent of Americans live below the poverty line or speak a foreign language at home?

P(live below) + P(speak foreign language)

=0.146 + 0.207

=0.353

=35.3%

(e) What percent of Americans live above the poverty line and only speak English at home?

P(live above poverty) x P(speak English)

=0.854 x 0.793

=0.677

=67.7%

(f) Is the event that someone lives below the poverty line independent of the event that the person speaks a foreign language at home?

P(speak foreign language l live below poverty)

= 0.146 / 0.207

=

2.20

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

P = 114/204 x 90/204+108 /204 x 96 /204

=0.246+0.249

=0.495

=49.5%

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

P = 78 /204

=0.382

=38.2%

(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?

P(males – brown and partner – blue)

=19/204

=9.31%

P(male-green and partner – blue)

=11/204

=5.39%

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

Yes, the eye colors of male and their partners are independent.

Because the probability are based on the number of survey for colors of males and females, it does not reflect the relationship affected by males or females.

2.30

 (a) Find the probability of drawing a hardcover book first then a paperback fiction book second when drawing without replacement.

P(1st hardcover and 2nd paper fiction book)

=28/95 x 59 / 94

= 92.2%

(b) Determine the probability of drawing a fiction book first and then a hardcover book second, when drawing without replacement.

P(1st friction book and 2nd hardcover book)

=(72/95 x 12/94) + (72/95 x 59/94)

=0.0967 + 0.475

= 57.2%

(c) Calculate the probability of the scenario in part (b), except this time complete the calculations under the scenario where the first book is placed back on the bookcase before randomly drawing the second book.

P(1st friction book – placed back and 2nd hardcover book)

=(72/95 x 12/95) + (72/95 x 59/95)

=0.0957 + 0.471

=56.6%

(d) The final answers to parts (b) and (c) are very similar. Explain why this is the case.

The 2 case are similar, the probability of without placing back are little bit larger than probability of placing back.

Because the number of book are increased, the probability of drawing the 2nd hardcover book will be decreased.

2.38

An airline charges the following baggage fees: $25 for the first bag and

$35 for the second. Suppose 54% of passengers have no checked luggage, 34% have one piece of checked luggage and 12% have two pieces. We suppose a negligible portion of people check more than two bags.

(a) Build a probability model, compute the average revenue per passenger, and compute the corresponding standard deviation.

54% no lugguage

34% 1 lugguage   - $25

12% 2 lugguage   - 25+35= $ 60
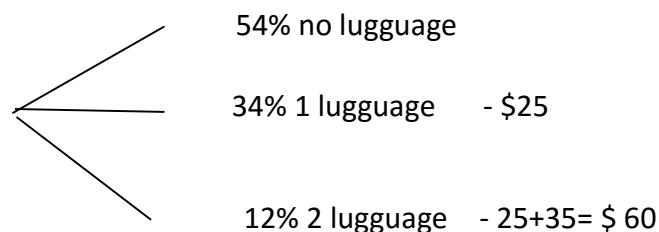
Average revenue = 0.54 x 0 + 0.34 x 25 + 0.12 x 60

= 8.5 +7.2

= 15.7

Xi	$0	$25	$60	
P(X=Xi)	0.54	0.34	0.12	
Xi x P(X=xi)	0	8.5	7.2	u= 15.7
xi-u	-15.7	-7.2	-8.5	
(xi-u)2	246.49	51.84	72.25	
(xi-u)xP(x=xi)	133.1	17.6	8.67	159.37

Variance of X is = 159.37

SD = 12.62

(b) About how much revenue should the airline expect for a flight of 120 passengers? With what standard deviation? Note any assumptions you make and if you think they are justified.

Revenue = 120 x 15.7

= 1884

SD= 12.62