Chapter 4 Practice Questions

1. An urn contains 7 red and 6 blue marbles. You reach in and randomly select 4 marbles without replacement. Find the probability that you will get:

a. 2 red and 2 blue marbles
b. all red marbles
c. all blue marbles
d. all marbles the same color
e. exactly 1 blue marble
f. at least 1 blue marble
g. at least 1 marble of each color
h. all red marbles, given that all marbles are the same color
i. all blue marbles, given that all marbles are the same color

2. Bert and Ernie and 4 other Muppets line up for a picture. If the 6 Muppets are arranged randomly, find the probability that:

a. Bert will be on the right end
b. Bert will be on the right end and Ernie will be on the left end
c. Bert and Ernie will be together on the left end
d. Bert and Ernie will be together

3. Given that events A and B are disjoint, $\boldsymbol{Pr[A] = 0.48}$, and $\boldsymbol{Pr[B] = 0.36}$, find

a. $Pr[A \cap B]$
b. $Pr[A \cup B]$
c. $Pr[A|B]$
d. $Pr[B|A]$

4. Given that events A and B are independent, $\boldsymbol{Pr[A] = 0.48}$, and $\boldsymbol{Pr[B] = 0.36}$, find

a. $Pr[A \cap B]$
b. $Pr[A \cup B]$
c. $Pr[A|B]$
d. $Pr[B|A]$
e. $Pr[A' \cap B']$

5. Given $\boldsymbol{Pr[C] = 0.31}$, $\boldsymbol{Pr[D] = 0.55}$, and $\boldsymbol{Pr[C \cup D] = 0.64}$, find

a. $Pr[C \cap D]$
b. $Pr[C']$
c. $Pr[C' \cap D']$
d. $Pr[C|D]$
e. $Pr[D|C]$

6. 45% of the students in a school are male. 12% of the male students are left-handed. 8% of the female students are left-handed. A student is randomly selected. Find the probability that

a. the student is right-handed, given that the student is female.
b. the student is left-handed and male.
c. the student is right-handed.
d. the student is male, given that the student is left-handed.

7. A coin with $\mathbf{Pr}[\boldsymbol{heads}] = \mathbf{0.75}$ is flipped four times. Find the probability of getting

a. all heads
b. exactly 3 heads
c. exactly 1 head
d. at least 1 head
e. at least 1 tail
f. at least 3 heads

8. A fair die is rolled 7 times. Rolling a 6 is considered a success. Find the probability of getting

a. exactly 1 success
b. at least 1 success
c. exactly 6 failures
d. at least 6 failures

9. Events A and B can occur at the first stage of a two-step experiment, while events C and D can occur at the second stage. Given $\mathbf{Pr}[A] = \mathbf{0.68}$, $\mathbf{Pr}[D|A] = \mathbf{0.44}$, and $\mathbf{Pr}[C|B] = \mathbf{0.3}$, find

a. $Pr[B]$
b. $Pr[D|B]$
c. $Pr[C]$
d. $Pr[B|D]$

10. Two fair dice are rolled and the sum is found. Find the probability of getting

a. a sum of 8
b. a sum that is not 8
c. a sum that is at least 8
d. a sum of 8, given that the red die showed a 5
e. at least one 5 on a die, given that the sum was 8
f. at least one 5 on a die, given the sum is at least 8

Chapter 4 Practice Answers: Equivalent fractions or decimals with at least 4 decimal places are also acceptable.

1.

a. $\frac{C(7,2)*C(6,2)}{C(13,4)} = \frac{315}{715}$

b. $\frac{C(7,4)}{C(13,4)} = \frac{35}{715}$

c. $\frac{C(6,4)}{C(13,4)} = \frac{15}{715}$

d. $\frac{C(7,4)+C(6,4)}{C(13,4)} = \frac{50}{715}$

e. $\frac{C(7,3)*C(6,1)}{C(13,4)} = \frac{210}{715}$

f. $1 - \frac{C(7,4)}{C(13,4)} = 1 - \frac{35}{715} = \frac{680}{715}$

g. $1 - \frac{C(7,4)}{C(13,4)} - \frac{C(6,4)}{C(13,4)} = 1 - \frac{35}{715} - \frac{15}{715} = \frac{665}{715}$

h. $\frac{C(7,4)}{C(7,4)+C(6,4)} = \frac{35}{50}$

i. $\frac{C(6,4)}{C(7,4)+C(6,4)} = \frac{15}{50}$

2.

a. $\frac{5!*1}{6!} = \frac{1}{6}$

b. $\frac{1*4!*1}{6!} = \frac{1}{30}$

c. $\frac{2*1*4!}{6!} = \frac{1}{15}$

d. $\frac{5!*2!}{6!} = \frac{1}{3}$

3.

a. 0

b. 0.48 + 0.36 = 0.84

c. $\frac{0}{0.36} = 0$

d. $\frac{0}{0.48} = 0$

4.

a. $0.48 * 0.36 = 0.1728$

b. $0.48 + 0.36 - 0.1728 = 0.6672$

c. $\frac{0.1728}{0.36} = 0.48$

d. $\frac{0.1728}{0.48} = 0.36$

e. $1 - 0.6672 = 0.3328$ or $(1 - 0.48) * (1 - 0.36) = (0.52)(0.64) = 0.3328$

5.

a. $0.31 + 0.55 - 0.64 = 0.22$

b. $1 - 0.31 = 0.69$

c. $1 - 0.64 = 0.36$

d. $\frac{0.22}{0.55} = \frac{22}{55} = \frac{2}{5}$

e. $\frac{0.22}{0.31} = \frac{22}{31}$

6. Draw a tree diagram.

a. $1 - .08 = 0.92$

b. $0.45 * 0.12 = 0.054$

c. $0.45 * 0.88 + 0.55 * 0.92 = 0.902$

d. $\frac{0.45*0.12}{0.45*0.12+0.55*0.08} = \frac{0.054}{0.098} = \frac{54}{98}$

7.

a. $(0.75)^4 \approx 0.3164$

b. $C(4,3)(0.75)^3(0.25)^1 \approx 0.4219$

c. $C(4,1)(0.75)^1(0.25)^3 \approx 0.0469$

d. $1 - (0.25)^4 \approx 0.9961$

e. $1 - (0.75)^4 \approx 0.6836$

f. $C(4,3)(0.75)^3(0.25)^1 + (0.75)^4 \approx 0.7383$

8.

a. $C(7,1)\left(\frac{1}{6}\right)^1\left(\frac{5}{6}\right)^6 \approx 0.3907$

b. $1-\left(\frac{5}{6}\right)^7 \approx 0.7209$

c. same as part a) 0.3907

d. At least 6 failures means 6 or 7 failures. This is the same as 0 or 1 success(es):

$C(7,1)\left(\frac{1}{6}\right)^1\left(\frac{5}{6}\right)^6 + (\frac{5}{6})^7 \approx 0.6698$

9. Draw a tree diagram with A and B on the first set of branches, C and D on the second set.

a. $1-.68=0.32$

b. $1-.3=0.7$

c. $0.68*0.56+0.32*0.3=0.4768$

d. $\frac{0.32*0.7}{0.32*0.7+0.68*0.44}=\frac{0.224}{0.5232}=\frac{2240}{5232}\approx 0.4281$

10. Draw the 6 by 6 table with 36 sums.

a. $\frac{5}{36}$

b. $1-\frac{5}{36}=\frac{31}{36}$

c. $\frac{15}{36}$

d. $\frac{1}{6}$

e. $\frac{2}{5}$

f. $\frac{7}{15}$