Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Problem Set 7.2 Solutions***

**1. Give an example of two dependent events:**

a) that have a large effect on each other

Various Answers Accepted

b) that have a small effect on each other

Various Answers Accepted

**2. Give a one sentence argument for each pair of events as to whether or not you think they are independent or dependent.**

a) first letter of your first name and the last letter of your math teacher’s last name

 Likely Independent. America is a countyr of immigrants with quite a variety of names represented. In this situation it is quite unlikely that the first letter of your first name has anything to do with your math teacher’s name.

b) eye color and hair color

Likely Dependent….genes and all

c) country you live in and the number of syllables in your name

Likely dependent due to differences in languages/cultures

d) birthdate and annual salary

Likely Independent

If birthdate includes year I lean towards dependent

If birthdate does not include year I lean towards independent

e) gender and cancer

Various Answers Accepted

Doesn’t specify type of caner

Prostate Cancer/Breast Cancer differ from Brain/Lunch cancer

f) a bag contains eight red marbles and four blue marbles. You randomly pick a marble and then pick a second marble without replacing the first marble. The first marble is red and the second marble is blue.

Dependent

g) A box of chocolates contains five milk chocolates, five dark chocolates, and five white chocolates. You randomly select and eat 3 chocolates. The first piece is milk chocolate, the second is dark chocolate, and the third is white chocolates.

Dependent

h) You flip a coin and then roll a fair six-sided die. The coin lands on tails and then the di shows a one.

Independent

i) A cooler contains ten bottles of sports drink: 4 lemon-lime, 3 orange, and 3 fruit punch. Three times, you randomly grab a bottle, return the bottle to the cooler, and then mix up the bottles. The first time you get a lemon lime. The second and third times you get a fruit punch.

Independent

3. Let’s take another look at the Titanic data from the last problem set and see how it relates to the ideas of conditional relative frequency and independent events.

a) Look back at the questions you answered about this table in PS 7.1. Did any of those questions involve a condition? If so, which ones? How did you include the condition when solving the problem?

H/I- only considered survivors so if it is conditional

RF(survival | passenger from 3rd class) = 178/706

RF(randomly selected passenger was a survivor from the third class) = 178/1316

b) What is the difference between the statements? Which of the statements is correct and why?

 “Most second-class passengers did not survive”

This is the correct statement because it is saying that of the 285 second class passengers, most of them did not survive. 167 died and 118 lived. So more died than lived.

 “Most of the people who didn’t survive were second class passengers.”

This isn’t true because there were far more third class passengers who died than second class passengers.

c) Are the events “passenger survived” and “passenger was in first class” independent events? Support your answer.

These are no independent events because the class of the passenger affected the chance of survival.

Let A = passenger survived and B = passenger in first class.

RF(A|B) = 202/325 which is approximately 0.662

RF (A) = 498/1316 which is approximately 0.378

Since RF(A|B) is not equal to RF(A) the events are dependent.

4. If two events are dependent, does that mean that one CAUSES the other? Why or why not? Recall our conversations from Chapter 2 about causation and use examples to help you explain your answer.

Not necessarily, correlation does not imply causation.

**5. Find the probability of the following events. If you leave your answers as fractions, simply as much as possible.**

a) You flip a coin and then roll a fair six-sided die. The coin lands on heads and the die shows an even number.

3/12 or ¼ or 0.25 or 25%

b) You roll a fair six-sided die twice. The first roll shows a five and the second roll shows a six.

1/36

c) There are eight shirts in your closet, four blue and four green. You randomly select one to wear on Monday and then wear a different one on Tuesday. You wear a blue shirt both days.

3/14

d) A basket contains five apples and seven peaches. You randomly select one piece of fruit and eat it. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece of fruit is a peach.

35/132

e) You draw a card from a standard deck of 52 cards. Then you draw a second card without replacing the first. The first card is a club and the second card is a 7. \*(Assume that the first card is no the 7 of clubs)\*

1/51

f) You draw a card from a standard deck of 52 cards. What is the probability that you draw a face card or a 3?

16/52 or 4/13