Stat 1 Pal Worksheet 8: Conditional Probabilities and Independent Events

Name_____

1. Consider the experiment of selecting at random a student from CSUS. Consider also the events B = the randomly selected student is a basketball player, and T = the event the randomly selected student is six feet or taller.
P(T)=the probability that the student behind the door is six feet or taller. The given probability for P(T) is .15 meaning 15% of CSUS students are six feet or taller.
a.) What is the probability that the student is six feet or taller *given* that the student is a basketball player? This probability is called *conditional probability* and is denoted P(T|B).
Would your answer for P(T|B) be smaller, equal, or larger than the given value of P(T) above?

2. Obtain the following prior and posterior probabilities to decide if two events are independent.
a.) T = event that student is six feet or taller

I = event that student owns an i-phone.

P(T) =
P(T|I) =
Are events T and I independent? Articulate your answer with a formal sentence.

b.) Consider the experiment of tossing a fair die. Consider also the events A = the number two comes up, and B = an even number comes up.

-Obtain P(A) and write a sentence articulating what P(A) stands for:

-Obtain P(A|B) and write a sentence articulating what P(A|B) stands for:
Are A and B independent? Write a sentence articulating your answer.

3. In the previous worksheet you learned that the following contingency table represents the gender and year in college of a classroom with 30 students:

	Freshman	Sophomore	Junior	Senior	Column Totals
Male	2	0	9	1	12
Female	4	6	5	3	18
Row Totals	6	6	14	4	30

A student is selected at random from this class:
Let F = event that randomly selected student is a female.
Let M = event that randomly selected student is a male.
Let Fr = event that randomly selected student is a freshman.
Let So = event that randomly selected student is a sophomore.

Let Jr = event that randomly selected student is a junior.
Let Sr = event that randomly selected student is a senior.

a.) Obtain P($F|Jr$) and write the reasoning to explain.

b.) Obtain P($Jr|F$) and write the reasoning to explain.

c.) Now obtain the prior probability P(Jr) to verify if events Jr and F are independent. Justify your answer with an articulate sentence.

d.) Obtain P($M|So$) and write the reasoning to explain.

e.) Now obtain the prior probability P(M) to verify if events M and So are independent. Justify your answer with an articulate sentence.

f.) Obtain P($Sr|F$) and write the reasoning using the events involved in this probability.

4. The conditional probability P($A|B$) can be written as the ratio of the two non-conditional probabilities. P($A|B$) P($A|B$) = $\frac{P(A \cap B)}{P(B)}$
Rewrite the conditional probabilities you obtain in Question 3 (b, d, and f) above as the ratio.
a.)
b.)
c.)

5.Forty percent of freshmen at a university said that they are taking a mathematics course, and 50 percent of them said that they are taking a writing course. 20 percent of them are taking both a mathematics and a writing course. A freshman is selected at random from this university. Let *M* = the event that the randomly selected student is taking a mathematics course, and *W* = the event that the randomly selected student is taking a writing course.
i. P(M) =
ii. P(W) =
iii. P($M \cap W$)=
a.) Among freshmen taking a mathematics course, what proportion is also taking a writing course?
b.) If a randomly selected student is taking a writing course, what is the probability that he or she is also taking a mathematics course?
c.) Draw a Venn Diagram to help you visualize P($M \cap W$) (the probability that the randomly selected student is taking both a mathematics and a writing course)
d.) Obtain P($M \cup W$) using the Venn Diagram from part c together with the Addition Rule
e.) What proportion of freshmen is taking a mathematics course but not a writing course? How would you denote this **event** and this **proportion**?
f.) What proportion of freshmen is taking a writing course but not a mathematics course? How would you denote this **event** and this **proportion**?