STAT 315 Chapter 2 Review Questions

Scenario A:
Experiment: A sprinter runs the 100 meter dash, and there are 8 athletes in the event. We record the place of the sprinter

1. List the sample space:

Define the following:
A="The sprinter finishes in the top 2" C="The sprinter finishes in the bottom 5"
B="The sprinter finishes in the top 5" D="The sprinter finishes in last place"

2. Write each event as a list of outcomes from the sample space.

For the following, draw a Venn diagram inside a box representing the sample space, and shade the appropriate region. Then write the relevant events from the sample space in set notation.

3. $A^c \cap B$

4. $[A \cap B] \cup [A \cap B^c]$

5. $[C \cup A^c] \setminus B$

Suppose each outcome is equally likely. Compute the following probabilities:

6. $P(C)$

7. $P(A \mid B)$

8. $P(B \mid A)$

9. $P(C \mid D^c)$

Scenario B

A carpenter is buying wood for some cabinets. These are custom cabinets, so the carpenter selects only the highest quality lumber from the hardware store. Suppose there are two lumber suppliers for the store, and each provides boards of varying quality:

	Excellent	Good	Fair	Poor	Total
Supplier 1	28	10	12	10	60
Supplier 2	13	15	10	12	50
Total	41	25	22	22	110

Experiment: The carpenter selects a board at random.

Let A="The carpenter selects a board from Supplier 1" B="The carpenter selects a Fair board"
C="The carpenter selects a board from Supplier 2"

1. Are the events A and B independent? Show your work with a calculation.

2. Are the events A and C independent? Argue your answer without using math.

3. Are the events A and B mutually exclusive?

4. Are the events A and C mutually exclusive?

Experiment: The carpenter selects two boards at random.

Let A="The carpenter selects two Excellent boards"

5. Compute P(A):

Scenario C

Circle whether the following statements are true never, true always, true when A and B are disjoint, or true when A and B are independent:

6. $P(A \cap B) = P(A|B)\,P(B)$ never always disjoint independent
7. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ never always disjoint independent
8. $P(A \cap B) = P(A)P(B)$ never always disjoint independent
9. $P(A \cap B) = P(A|B)\,P(A)$ never always disjoint independent
10. $P(A \cup B) = P(A) + P(B)$ never always disjoint independent
11. $P(A \cup B) = P(A)P(B)$ never always disjoint independent
12. $P(B) = P(B|A)P(A) + P(B|A^c)P(A^c)$ never always disjoint independent