Math 13 - Homework 5

Name: _____ **Class Number:** _____

1) Consider the following two events for an individual: 1) A = owns a smartphone; 2) B = owns a tablet. Translate each of the events given below into words:

a. A^c
b. A and B
c. A or B
d. $A \mid B$
e. $B \mid A$

2) A box contains three balls: one red, one blue, and one yellow. Consider an experiment that consists of withdrawing a ball from the box, replacing it, and withdrawing a second ball.

a. What is the sample space of this experiment?
b. What is the event that the first ball drawn is yellow?
c. What is the event that the same ball is drawn twice?

3) A sample space consists of 4 simple events: *A, B, C, D*. Which events comprise the complement A? Can the sample space be viewed as having two events, A and A^c? Explain.

4) From the following numbers, indicate those that could NOT possibly be probabilities

a. 0.462
b. -0.201
c. 0
d. 1
e. 6/5
f. 3.5
g. 110%
h. 999.9999 / 1000

5) A bowl contains 12 poker chips: 3 red, 4 white, and 5 blue. If one of these poker chips is selected at random from the bowl, what is the probability that its color is

a. red?
b. red or white?
c. not white?

6) Consider the experiment of tossing a fair coin 3 times. For each coin, the possible outcomes are heads or tails.

a. List the equally likely events of the sample space for the 3 tosses.

b. What is the probability that all three coins come up heads?

7) Given that $P(A) = 0.7$ and $P(B|A) = 0.3$, find $P(A \text{ and } B)$

8) For a class activity, your group has been assigned the task of generating a quiz question that requires use of the formula for conditional probability to compute $P(B|A)$. Your group comes up with the following question: "If $P(A \text{ and } B) = 0.40$ and $P(A) = 0.20$, what is the value of $P(B|A)$?" What is wrong with this question?

9) Class records at BCC indicate that a student selected at random has probability 0.68 of passing prealgebra. For the student who passes prealgebra, the probability is 0.75 that he or she will pass algebra. What is the probability that a student selected at random will pass both prealgebra and algebra?

10) Suppose there are 100 students in your calculus class, 10 of whom are left-handed. Two students are selected at random. What is the probability of the following events:

a. Both are right-handed.
b. Both are left-handed.
c. One is right-handed and the other is left-handed.
d. At least one is right-handed.

11) A tech startup has submitted bids on two separate contracts. The company CEO believes that there is a 45% probability of winning the first contract. If they win the first contract, the probability of winning the second is 80%. However if they lose the first contract, the CEO thinks that the probability of winnig the second contract decreases to 55%.

a. What is the probability that they win both contracts?
b. What is the probability that they lose both contracts?
c. What is the probability that they win only one contract?

12) Choose an American adult aged 20 years and over at random. Define two events: A = the person chosen is obese; B = the person chosen is overweight, but not obese. According to the National Center for Health Statistics, $P(A) = 0.36$ and $P(B) = 0.33$.

a. Explain why events A and B are disjoint.
b. Say in plain language what "A *or* B" is.
c. If C is the event that the person chosen has normal weight or less, what is $P(C)$?

13) Two cards will be dealt off the top of a well-shuffled deck. You have a choice: (i) To win \$1 if the first card is a king; or (ii) To win \$1 if the first card is a king and the second card is a queen. Which option is better? Or are they equivalent? Eplain?

14) The following pairs of events E and F relate to the same experiment. Tell in each case whether E and F are disjoint (i.e. mutually exclusive) events.

a. A die is rolled. Event E is that it lands on an even number, and F is the event that it lands on an odd number.

b. A die is rolled. Event E is that it lands on 3, and F is the event that it lands on an even number.
c. A person is chosen. Event E is that this person was born in the United States, and F is the event that this person is a U.S. citizen.
d. A man is chosen. Event E is that he is over 30 years of age, and F is the event that he has been married for over 30 years.
e. A woman waiting in line to register her car at the department of motor vehicles is chosen. Event E is that the car is made in the United States, and F is the event that it is made in a foreign country.

15) True or false, and explain.

a. If a die is rolled three times, the chance of getting at least one ace is $1/6 + 1/6 + 1/6 = 1/2$.
b. If a coin is tossed twice, the chance of getting at least one head is 100%.

16) Suppose that 25% of a forest consists of trees of species A, 40% of species B, and 35% of species C.

a. What is the probability that a tree selected at random will be of species A?
b. What is the probability that the tree selected will not be of species A?
c. If it is known that the tree is not of species A, what is the probability that it will be of species B?

17) What is wrong with the following argument? "If two coins are tossed, then there are three possible outcomes: (1) 2 heads, (2) 1 head and 1 tail, (3) 2 tails. Hence the probability of two heads is 1/3"

18) At a certain university in the United States, 62% of the students are at least bilingual speaking English and at least one other language. Of these students, 80% speak Spanish and, of the 80% who speak Spanish, 10% also speak French. Determine the probability that a randomly selected student at this university:

a. Does not speak Spanish.
b. Speaks Spanish and French.