Name: _____

Group _____



THE ANNUAL DEATH RATE AMONG PEOPLE WHO KNOW THAT STATISTIC IS ONE IN SIX. http://imgs.xkcd.com/comics/conditional_risk.png

2. Assume that you have a set of all families that have two children

a) A family is selected at random and is found to have a girl. What is the probability that the other child of the family is a girl?

b) A child is selected at random and is found to be a girl. What is the probability that the other child of the family is a girl?

3. Roll a fair 4-sided die 3 times.A: two 1's are tossedB: the first roll is a 1

C: the second roll is a 1

a) Calculate P(B|A)

b) Calculate P(A|B)

c) Explain why a) \neq b) mathematically and using the interpretation of conditional probabilities.

d) When would P(B|A) = P(A|B)?

e) Calculate P(B|C)

f) Calculate P(C|B)

4. A bus arrives punctually at a bus stop every half hour. Each morning, a commuter named Sarah leaves her house and casually strolls to the bus stop.

a) Find the probability that that wait time is at least 10 minutes.

b) Find the probability that the wait time is at least 10 minutes given that if someone is waiting there for more than 15 minutes, they will get a ride from a passing car.

c) Find the probability that the wait time is at most 10 minutes given that if someone is waiting there for more than 15 minutes, they will get a ride from a passing car.

d) What is the sum of b) and c)? Write this in symbols.

5. Assume that the probability that there will be more than 1 inch of snow next week given that the temperature rises above 30 °F is 0.3.

a) What is the probability that there will be less than 1 inch of snow next week given that the temperature rises above 30 °F?

b) Given that the probability that there will be more than 2 inches of rain given that the temperature rises above 30 °F is 0.8 and the probability that there will be more than 2 inches of rain and there will be less than 1 inch of snow given that the temperature rises above 30 °F is 0.6, what is the probability that there will be more than 2 inches of rain or there will be less than 1 inch of snow given that 2 inches of rain or there will be less than 1 inch of snow 30 °F?

6. You have a batch of 10 fuses where you know that 2 of them are bad. To figure out which fuses are bad, you need to test each one individually. After you test the fuse, you do not put it back in with the old fuses. You will be taking two fuses from the batch.

a) What is the probability that both fuses are bad?

b) What is the probability that both fuses are good?

c) What is the probability that the first fuse is bad and the second fuse is good?

d) What is the probability that the first fuse is good and the second fuse is bad?

e) What is the relationship between parts c) and d)? Explain why this is not a coincidence.

f) Without doing a calculation, what would the probability of drawing three fuses of having the first two bad and the last one good?

7. Draw one card from a shuffled deck of 52 cards.

a) What is the probability that the card is a spade if you know that the card is a 7?

b) What is the probability that the card is a 7 if you know that the cards is a spade?

c) What is the probability that the card is a spade if you know that the card is black?

d) What is the probability that the card is black if you know the card is a spade?

e) What if the probability that the card is a 7 if you know that the card is black?

f) What is the probability that the card is black if you know that the card is a 7?

8. You roll two 6-sided dice. Let A be the event that the sum of the dice is an even number. Let B be the event that the two results are different. If A has occurred, what is the probability B has also occurred.

Hint: Write down what is given first!

9. In the PGA, on par 3 holes, golfers hit the green in one shot 80% of the time. In fact, 20% of the time, they hit the green in one shot and then need only one putt to complete the hole; so 60% of the time, they hit the green in one shot but are unsuccessful on their putt. What is the probability that a PGA golfer only needs one putt, given that he hits the green in one shot?

10. An article in *Science News* (2000, Vol. 157, p.135), reported on research by InterSurvey and the Quantitative Study of Society on the effects of regular Internet usage. According to the article, 36% of Americans with internet access are regular Internet users, meaning that they log on for at least 5 hours per week. Among regular Internet users, 25% say that the Web has reduced their social contacts. Determine the probability that a randomly selected American with Internet access is an regular Internet user who reels that the Web has reduced his or her social contact.

11. The U.S. Congress, Joint Committee on Printing, provides information on the composition of Congress in the *Congressional Directory*. For the 107th congress, 18.7% of the members are senators (I hope this doesn't change too quickly!) and 50% of the senators are Democrats. What is the probability that a randomly selected member of the 107th Congress is a Democratic senator?

12. The National Center for Education Statistics publishes data about educational instructions in the *Digest of Education Statistics*. According to that publication, 13.4% of all students attend private schools, and 4.5 % of all students attend private colleges. What percentage of students attending private schools are in college?