# PRACTICE SHEET

## PROBABILITY

1. A student takes a test with 16 multiple-choice questions. Since she has never been to class, she has to choose at random from the 4 possible answers. What is the probability that she will get exactly 3 right?

2. Tickets numbered 1 to 25 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 7?

3. What is the probability that the numbers 11, 4, 17, 39, and 23 are drawn in that order from a bin containing 50 balls labeled with the numbers 1, 2,..., 50 if
   (a) the ball selected is not returned to the bin before the next ball is selected and
   (b) the ball selected is returned to the bin before the next ball is selected?

4. What is the probability that Bo, Colleen, Jeff, and Rohini win the first, second, third, and fourth prizes, respectively, in a drawing if 50 people enter a contest and
   (a) no one can win more than one prize.
   (b) winning more than one prize is allowed.

5. Suppose that one person in 100,000 has a particular rare disease for which there is a fairly accurate diagnostic test. This test is correct 99.0% of the time when given to a person selected at random who has the disease; it is correct 99.5% of the time when given to a person selected at random who does not have the disease. Given this information can we find
   (a) the probability that a person who tests positive for the disease has the disease?
   (b) the probability that a person who tests negative for the disease does not have the disease?

6. Suppose that Ann selects a ball by first picking one of two boxes at random and then selecting a ball from this box. The first box contains three orange balls and four black balls, and the second box contains five orange balls and six black balls. What is the probability that Ann picked a ball from the second box if she has selected an orange ball?

7. The probability of a male being corona infected is 0.7 and if a male is infected, then the probability of his wife being corona infected is 0.9. But if the person is not infected, even then there is a chance for his wife being infected with probability 0.8.
   (a) Find the probability of the wife being infected

(b) Find the probability of a male person not being infected if his wife is found to be infected?
(c) Find the probability of the person being infected if his wife is found to be not infected?

8. Suppose that 8% of the patients tested in a clinic are infected with HIV. Furthermore, suppose that when a blood test for HIV is given, 98% of the patients infected with HIV test positive and that 3% of the patients not infected with HIV test positive. What is the probability that
   (a) a patient testing positive for HIV with this test is infected with it?
   (b) a patient testing positive for HIV with this test is not infected with it?
   (c) a patient testing negative for HIV with this test is infected with it?
   (d) a patient testing negative for HIV with this test is not infected with it?

9. A college is composed of 70% men and 30% women. It is known that 40% of the men and 60% of the women smoke. What is the probability thata student seen smoking is a man?

10. Suppose we pick 4 balls out of an urn with 12 red balls and 8 black balls. What is the probability of B = “we get two balls of each color”?

11. An urn contains 5 red and 10 black balls. We draw 2 balls from the urn without replacement. What is the probability that the second ball drawn is red?

12. Based on past experience, 70% of students in a certain course pass the midterm exam. The final exam is passed by 80% of those who passed the midterm, but only by 40% of those who fail the midterm. What fraction of students pass the Final?

13. Al flips 3 coins and Betty flips 2. Al wins if the number of heads he gets is more than the number Betty gets. What is the probability that Al will win?

14. Suppose that the probability that a married man votes is 0.45, the probability a married woman votes is 0.4, and the probability a woman votes given that her husband does is 0.6. What is the probability that (a) both vote? (b) A man votes given that his wife does?

15. Two events have $P(A) = 1/4$, $P(B|A) = 1/2$, and $P(A|B) = 1/3$. Compute $P(A \cap B)$, $P(B)$, and $P(A \cup B)$.

16. Suppose we roll a red die and a green die. What is the probability that the number on the red die is larger than the number on the green die?

17. Two dice are rolled. What is the probability that
   (a) the two numbers will differ by 1 or less and

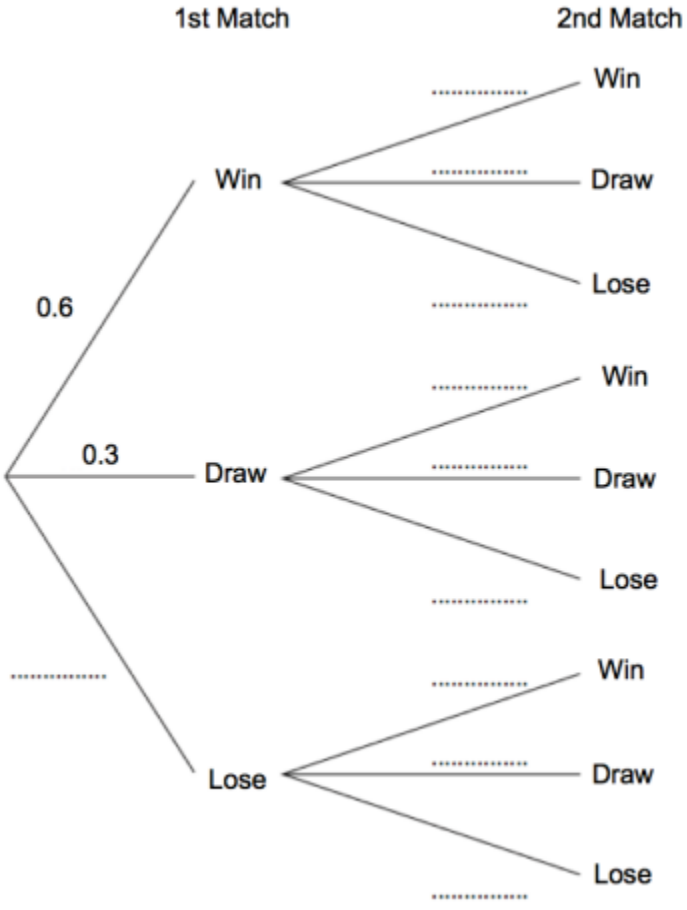
(b) the maximum of the two numbers will be 5 or larger?

18. If we flip a coin 5 times, what is the probability that the number of heads is an even number (that is, divisible by 2)?

19. Suppose we roll three dice. Compute the probability that the sum is
(a) 3, (b) 4, (c) 5, (d) 6, (e) 7, (f) 8, (g) 9, (h) 10.

20. The probability that a train arrives late is 0.2 James is traveling by train on Saturday and Sunday.
(a) Show this information on a probability tree diagram.
(b) Calculate the probability the train is on time both days

21. A football team has two matches to play. The probability that the team wins is 0.6. The probability that the team draws is 0.3.
(a) Complete the tree diagram




(b) Work out the probability that the team will win both matches.