

Fall 2019 COT 3100 Homework 8
Please Consult WebCourses for the due date/time

Note: Please justify your answers and why you use each formula.

- 1) In a tennis league, there are eight teams of 7 players each. A set of 10 players is selected randomly out of the 56 players in the league. What is the probability that at least one player from each team will be selected?
- 2) 50 tickets are sold in a raffle where 6 prizes will be given. Terri buys 10 of the tickets. What is the probability that Terri wins k prizes, where k is an integer in between 0 and 6, inclusive? Please give your answer in terms of k .
- 3) A point is chosen at random inside of a unit square. What is the probability that the point is farther than half a unit from any of the four corners of the square?
- 4) Sam's probability of getting an A on an individual test is 85%. If he takes 12 tests, what is the probability he gets As on exactly 10 of those tests?
- 5) Ashok arrives at Starbucks at a random time in between 9:00 am and 9:20 am and Melina arrives at Starbucks at a random time in between 9:10 am and 9:30 am. Both stay for exactly 15 minutes. What is the probability that the two of them are in the Starbucks at the exact same time?
- 6) Jessica is taking an exam. She will continue attempting to take the exam until she passes it. Because she studies, each time she takes the exam, her chance of passing increases. Let p be her probability of passing the exam the first time she takes it. This means that her probability of failing the exam her first time is $1 - p$. On her i^{th} attempt, her probability of failing is $(1 - p)^{2^{i-1}}$. Thus, if $p = .5$, if she fails the first time, her chance of failing the second time is just $.5^2 = .25$. If she fails both the first and second time, her chance of failing the third time is just $.5^4 = .0625$. What is the expected number of times Jessica will take the exam, in terms of p ?
- 7) Suppose that one person in 1,000 people has a rare genetic disease. There is an excellent test for the disease; 98% of the people with the disease test positive and only 4% of the people who don't have it test positive. What is the probability that someone who tests positive has the disease? What is the probability that someone who tests negative does not have the disease?
- 8) Suppose E and F are events in a sample space and $p(E) = 1/3$, $p(F) = 2/5$, and $p(F | E) = 9/10$. Find $p(E | F)$.
- 9) Give a summary of the mathematical contributions of Shafi Goldwasser, until now. Please aim for a length of roughly 200 - 400 words. **Your summary must be typed.** Please state the sources you used in writing your summary.