

Midterm (75 minutes)

No calculators allowed. Just set up your answers, for example, $P = 49/52$. If you want extra time, you can buy time at a price of 1 point a minute; for example, if your test is handed in 10 minutes after the scheduled finish time, 10 points will be subtracted from your test score.

1. Based on interviews with 700 couples who had been married for decades, Karl Pillemer, professor of human development at Cornell University, identified several secrets for a long-lasting marriage, including generosity, kindness, and effective communication. Even if this were a random sample of couples who had been married for decades, what is the main problem with these data? What would have to be done to avoid this problem?

2. Emily regularly bets Emiliano that the price of a stock she selects will go up tomorrow. Emiliano pays her \$10 if she is right and Emily pays him \$11 if she is wrong. For what values of P , the probability that the stock she selects will go up, is her expected value from this bet positive?

3. Over the 141-year period 1878-2018, annual rainfall at the Los Angeles Civic Center has averaged 14.50 inches with a standard deviation of 6.68 inches.
 - a. Annual rainfall was 3.60 inches in 2013. If rainfall each year is independent of rainfall in other years and randomly determined from a normal distribution with a mean of 14.50 inches and a standard deviation of 6.68 inches, what is the probability that annual rainfall would be so far below average?

 - b. Annual rainfall in Los Angeles is, in fact, not normally distributed. Explain why you believe that it is either skewed left or skewed right.

8. In 2018, Eric Reid, a Carolina Panthers football player, said that the National Football League (NFL) was using its purportedly random drug-testing program to target him since he had been tested 7 times in 11 weeks. The NFL and NFL Players Association investigated his complaint and concluded that Reid's tests were indeed random. His first drug test was a mandatory test after he had signed with the Panthers. After that initial test, 10 players on each NFL team are randomly selected each week. There are 72 players eligible for testing on the Carolina roster; assume that all 32 NFL teams have 72 players eligible for testing. If the testing is truly random, what is the probability that
- Reid will be selected 6 or more times in 11 weeks?

b. One or more Carolina players would be selected 6 or more times in 11 weeks?

c. One or more NFL player would be selected 6 or more times in 11 weeks?

9. What's wrong with this reasoning: During warm-ups before a baseball game, the catcher made a bad throw to second that sailed over the second baseman's head. The coach said, "Great job, you didn't waste a good throw."

10. Identify two serious problems with this chart from a "trusted news source":

