Practice Midterm Exam: Probability

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2/14/2022

Practice Problems

1. Consider rolls of a four-sided die. A bet is placed that a 1 will occur on a single roll of the die. Thus, $E = \{1\}$, $E' = \{2, 3, 4\}$, and $\theta = \frac{1}{4}$.

2. A student answers 20 true-false questions at random. What is the probability of getting 100% on the test? What is the probability of getting 80% on the test?

3. A box contains 10 purple marbles and 20 orange marbles, and five marbles are selected with replacement. What is the probability of getting exactly 2 purple marbles?

4. Research has shown that 4 out of 10 5th graders in Utah can locate the state of Colorado on a map. What is the probability that you will have to sample 5 students before one can locate Colorado on the map?

5. The probability a certain baseball player gets a hit is 0.3, and we assume that times at bat are independent. What is the probability that he will require 5 times at bat before he gets a hit?

6. Team A plays team B in a seven-game world series. That is, the series is over when either team wins four games. For each game, $P(A wins) = 0.6$, and the games are assumed independent. What is the probability that the series will end in exactly six games?

7. A child is responsible for selling candy bars to raise money for a school field trip. There are 30 houses in the neighborhood and the child is told to not come home until 5 candy bars are sold. Let's say that there is a 0.6 probability of selling a candy bar at each house and that they are independent. What is the probability that the child has to visit each house in the neighborhood?

8. The number of industrial accidents at a particular manufacturing plant is found to average 3 per month. During the last month 6 accidents occurred. Does this number seem highly improbable if μ is still equal to 3? Does it indicate an increase in the mean μ?

9. The number of typing errors made by a particular typist has a Poisson distribution with an average of 4 errors per page. If more than four errors appear on a given page, the typist must retype the whole page. What is the probability that a certain page does not have to be retyped?

10. The number of knots in a particular type of wood has a Poisson distribution with an average of 1.5 knots in 10 cubic feet of the wood. Find the probability that a 10-cubic-foot block of wood has a most one knot?