# HOGG AND TANIS PROBABILITY AND STATISTICAL INFERENCE 9TH EDITION pdf

## 1: Probability and Statistical Inference () :: Homework Help and Answers :: Slader

*Tanis is the co-author of A Brief Course in Mathematical Statistics with R. Hogg and Probability and Statistics: Explorations with MAPLE 2 nd edition with Z. Karian. He has authored over 30 publications on statistics and is a past chairman and governor of the Michigan MAA, which presented him with both its Distinguished Teaching and.*

Let C be the event that the disk will land entirely on one tile. In order to assign a value to P C , consider the center of the disk. In what region must the center lie to ensure that the disk lies entirely on one tile? If you draw a picture, it should be clear that the center must lie within a square having sides of length 2 and with its center coincident with the center of a tile. Sometimes the nature of an experiment is such that the probability of A can be assigned easily. Probabilities of events associated with many random experiments are perhaps not quite as obvious and straightforward as was seen in Example 1. A function such as P A that is evaluated for a set A is called a set function. In this section, we consider the probability set function P A and discuss some of its properties. In succeeding sections, we shall describe how the probability set function is defined for particular experiments. Hopefully, these remarks will help to motivate the following definition. The theorems that follow give some other important properties of the probability set function. When one considers these theorems, it is important to understand the theoretical concepts and proofs. However, if the reader keeps the relative frequency concept in mind, the theorems should also have some intuitive appeal. Proof [See Figure 1. Proof In Theorem 1. Property a , along with Theorem 1. If the right-hand side of this equation is substituted into Equation 1. Let A and B be the events that the respective trains are on time. The details are left as an exercise. Let a probability set function be defined on a sample space S. The integer m is called the total number of ways in which the random experiment can terminate. If each of these outcomes has the same probability of occurring, we say that the m outcomes are equally likely. If the number of outcomes in an event A is h, then the integer h is called the number of ways that are favorable to the event A. In this case, P A is equal to the number of ways favorable to the event A divided by the total number of ways in which the experiment can terminate. This assumption is then an important part of our probability model; if it is not realistic in an application, then the probability of the event A cannot be computed in this way. Actually, we have used this result in the simple case given in Example 1. However, instead of drawing only one card, suppose that 13 are taken at random and without replacement. Then we can think of each possible card hand as being an outcome in a sample space, and it is reasonable to assume that each of these outcomes has the same probability. For example, using the preceding method to assign the probability of a hand consisting of seven spades and six hearts, we must be able to count the number h of all such hands as well as the number m of possible card hands. In these more complicated situations, we need better methods of determining h and m. We discuss some of these counting techniques in Section 1. What is the probability of a randomly selected person from this group visiting a physical therapist? Find the probability that a customer selected at random insures exactly one car and it is not a sports car. Draw one card at random from a standard deck of cards. The sample space S is the collection of the 52 cards. A fair coin is tossed four times, and the sequence of heads and tails is observed. Consider the trial on which a 3 is first observed in successive rolls of a six-sided die. Let A be the event that 3 is observed on the first trial. Let B be the event that at least two trials are required to observe a 3. Of those coming to that office, the probability of having lab work is 0. What is the probability of having both lab work and a referral? Roll a fair six-sided die three times. A typical roulette wheel used in a casino has 38 slots that are numbered 1, 2, 3,. The 0 and 00 slots are colored green. Half of the remaining slots are red and half are black. Also, half of the integers between 1 and 36 inclusive are odd, half are even, and 0 and 00 are defined to be neither odd nor even. Give the value of P A. Give the value of P B. Give the value of P D. Let x equal a number that is selected randomly from the closed interval from zero to one, [0, 1]. Divide a line segment into two parts by selecting a point at random. Use your intuition to assign a probability to the event that the longer segment is at least two times longer than the shorter segment. What is the probability that the holder will file two or more claims during this period? We begin with a consideration of the multiplication principle. Suppose that an experiment or procedure E1 has n1 outcomes and, for each of these possible outcomes, an experiment procedure E2 has n2 possible outcomes. Then the composite experiment procedure E1 E2 that consists of performing first E1 and then E2 has n1 n2 possible outcomes. Then the outcome for the composite experiment can be denoted by an ordered pair, such as F, P. Clearly, the multiplication principle can be extended to a sequence of more than two experiments or procedures. E1 , soup or tomato juice; E2 , steak or shrimp; E3 , French fried potatoes, mashed potatoes, or a baked potato; E4 , corn or peas; E5 , jello, tossed salad, cottage cheese, or coleslaw; E6 , cake, cookies, pudding, brownie, vanilla ice cream, chocolate ice cream, or orange sherbet; E7 , coffee, tea, milk, or punch. How many different dinner selections are possible if one of the listed choices is made for each of E1 , E2 ,. Although the multiplication principle is fairly simple and easy to understand, it will be extremely useful as we now develop various counting techniques. Suppose that n positions are to be filled with n different objects. Suppose that a set contains n objects. Consider the problem of drawing r objects from this set. The order in which the objects are drawn may or may not be important. In addition, it is possible that a drawn object is replaced before the next object is drawn. Accordingly, we give some definitions and show how the multiplication principle can be used to count the number of possibilities. By the multiplication principle, the number of possible ordered samples of size r taken from a set of n objects is nr when sampling with replacement. Note that this is the number of four-digit integers between and , inclusive. Often the order of selection is not important and interest centers only on the selected set of r objects. That is, we are interested in the number of subsets of size r that can be selected from a set of n different objects. In order to find the number of unordered subsets of size r, we count, in two different ways, the number of ordered subsets of size r that can be taken from the n distinguishable objects. Then, equating the two answers, we are able to count the number of unordered subsets of size r. Let C denote the number of unordered subsets of size r that can be selected from n different objects. We can obtain each of the n Pr ordered subsets by first selecting one of the C unordered subsets of r objects and then ordering these r objects. Since the latter ordering can be carried out in r! Thus, we have C r! The binomial coefficients are given in Table I in Appendix B for selected values of n and r. Assume that each of the from Table I in Appendix B. Now suppose that a set contains n objects of two types: The number of permutations of n different objects is n!. However, in this case, the objects are not all distinguishable. To count the number of distinguishable arrangements, first select r out of the n positions for the objects of the first type. Then fill in the remaining positions with the objects r of the second type. There are four lavender orchids and three white orchids. The foregoing results can be extended. Suppose that in a set of n objects, n1 are similar, n2 are similar,. Then the number of distinguishable permutations of the n objects is see Exercise 1. This is sometimes called a multinomial coefficient. When r objects are selected out of n objects, we are often interested in the number of possible outcomes. We have seen that for ordered samples, there are 18 Chapter 1 Probability nr possible outcomes when sampling with replacement and n Pr outcomes when sampling without replacement. For unordered samples, there are n Cr outcomes when sampling without replacement. Each of the preceding outcomes is equally likely, provided that the experiment is performed in a fair manner. REMARK Although not needed as often in the study of probability, it is interesting to count the number of possible samples of size r that can be selected out of n objects when the order is irrelevant and when sampling with replacement. For example, if a six-sided die is rolled 10 times or 10 six-sided dice are rolled once , how many possible unordered outcomes are there? Each distinguishable permutation is equivalent to an unordered sample. A boy found a bicycle lock for which the combination was unknown. How many different lock combinations are possible with such a lock? In designing an experiment, the researcher can often choose many different levels of the various factors in order to try to find the best combination at which to operate.

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