CHAPTER 9

FILL-IN-THE-BLANK ITEMS

Introduction

Intuitively, we understand that most of the statistics we are given are only (1) _________________ because they are based on a sample from the larger group of interest—the (2) _________________. In this chapter, we discuss the process of (3) _________________ and how to determine the range within which our (4) _________________ should fall.

The Sampling Distribution of Means

The sample mean is an (5) _________________ estimate of the population mean. The sampling distribution of means is derived by extracting successive random samples, all with the same (6) _________________, from some population. For each sample, the mean of some characteristic is computed and the (7) _________________ are plotted on a (8) _________________ polygon. The resulting polygon is called the (9) _______________ ______________ ________________ ______________.

The properties of the sampling distribution of means are as follows:

1. The mean of the sampling distribution equals (10) _________________.

2. The larger the size of each sample taken from the parent population, the more nearly the sampling distribution approximates the (11) _________________ curve. This property is a simplified version of the (12) _________________ _________________ _________________ .

3. The larger the size of each sample taken from the population, the smaller the (13) _________________ _________________ of the sampling distribution. The standard deviation is called the (14) _________________ _________________ of the mean and is symbolized by (15) _________________.

The equation for a *z* score based on the sampling distribution of means is (16) _________________.

z scores obtained for a sample mean can be used in the same way as *z* scores for a (17) _________________ _________________.

Estimation and Degrees of Freedom

Often, we must estimate population values for μ and σ from our (18) _________________. We can use (19) _________________ to estimate the population mean and (20) _________________ to estimate the population standard deviation. As you recall from Chapter 6, in the equation for our unbiased estimate of population variance, we divided the sum of squared deviations by (21) _________________ rather than by *N* because of the tendency of the equation with *N* in the denominator to (22) _________________ either the population variance or the population standard deviation.

$N - 1$ is referred to as (23) _________________ _________________ _________________, which is defined as the number of (24) _________________ free to vary after certain (25) _________________ have been placed on the data.

A *t* score is an estimated (26) _________________ and corresponds to a (27) _________________ distribution. The mathematics of the distribution were derived by William Sealy (28) _________________, who published under the pseudonym (29) _________________.

Confidence Intervals

A (30) ________________ ________________ is a range of values around a sample mean within which μ almost certainly lies. The confidence intervals usually computed are the 95% and the (31) ________________. The equations for the confidence intervals are derived from the formula used to convert (32) ________________ to raw scores. Instead of z scores, the confidence interval equation requires (33) ________________ obtained from Table (34) ________________.

For confidence intervals, df = (35) ________________. The t distribution changes shape with changes in (36) ________________ ________________. Rather than being an exact estimate of the population mean, the confidence interval is an (37) ________________ estimate.

Hypothesis Testing: One-Sample *t Test*

The one-sample t test is a procedure for testing the (38) ________________ ________________. The null hypothesis, symbolized by (39) ________________ , assumes a particular value for a population parameter—in this case, for (40) ________________, the mean of the sampling distribution of means. The alternative to the null hypothesis is that the value of (41) ________________ is something other than what we have assumed it to be. If the alternative hypothesis, symbolized by (42) ________________, doesn't specify the direction in which H_0 will differ from μ, we say it is (43) ________________. On the other hand, an alternative hypothesis stating that μ will either be greater than H_0 or less than H_0 is called a (44) ________________ hypothesis.

The seven-step procedure for testing the null hypothesis is as follows:

1. State the (45) ________________ hypothesis in symbols and words.

2. State the alternative hypothesis in symbols and words.

3. Choose an (46) ________________ level, which will always be set to .05 or .01 unless there are some special circumstances. Set α = (47) ________________, if there are no other instructions in the problem.

4. State the (48) ________________ rule.

5. Compute the (49) ________________ statistic.

6. Make a (50) ________________ by applying the rejection rule.

7. Write a (51) _________________ statement in the (52) _________________ of the problem.

Directional tests

For a directional test, t_{comp} should have the (53) _________________ sign as t_{crit}. In addition, with a directional test, t_{crit} should be (54) _________________ extreme than for a nondirectional test, because all of the probability is placed in (55) _________________ _________________ of the distribution. For this reason, directional tests are (56) _________________ powerful than nondirectional tests but hazardous if the (57) _________________ of the outcome cannot be predicted in advance.

Type I and Type II errors

The process of rejecting or failing to reject H_0 is sometimes called (58) _________________ _______________ _________________. Rejecting H_0 when it is true is called a Type (59) _________________ or (60) _________________ error. The probability of committing this type of error is determined by the value we set for (61) _________________. Lowering the value of alpha will (62) _________________ the probability of this type of error.

Failing to reject a false null hypothesis is called a Type (63) _________________ or (64) _________________ error. Although the probability of this type of error is unknown, it is increased by (65) _________________ in the value of alpha.

The power of a statistical test

The (66) _________________ of a test is the probability that the test will detect a false hypothesis, given by the equation (67) _________________ = _________________. Factors affecting power are the value of (68) _________________, the (69) _________________ of the sample taken from the population, and the distance between the hypothesized value of μ and the true value. Specifically, the smaller we set α, the (70) _________________ the power of the test will be. Also, the (71) _________________ the sample size, the greater the power of the test will be. Finally, the greater the distance between the hypothesized value of μ and the true value, the (72) _________________ the power of the test will be.

Meta-analysis

The magnitude of the difference between H_0 and H_1, called the (73) _________________ _________________, is the point of departure in the quantitative analysis of large numbers of research studies using (74) _________________. This form of analysis is more interested in (75) _________________ _________________ than in whether a significant effect is present in a study.

Should hypothesis testing be abandoned?

Some researchers say we should (76) _________________ hypothesis testing because the (77) _________________ _________________ in psychology experiments is really much higher than most researchers think. Anti-hypothesis testers claim that a large percentage of studies don't have enough (78) _________________ to detect an effect even when the effect is present. As a consequence, Type (79) _________________ errors are committed at high rates, sometimes as high as 60%. This point is valid if it forces experimenters to be more attentive to having sufficient (80) _________________ in their experiments.

Troubleshooting Your Computations

When the confidence interval has been computed, look at it to be sure that it is (81) _________________ in the light of your data. For example, the confidence interval should contain the (82) _________________ of the sample. Be sure to use (83) _________________ rather than *N* when finding the *t* score from Table B.

When computing *t* scores, the appropriate (84) _________________ should be retained throughout the computations. If the hypothesized mean is larger than the mean of the sample, the resulting value of *t* should be (85) _________________. Be sure that the absolute value of your computed *t* is larger than the critical value of *t* from the table before (86) _________________ H_0, if you're testing a nondirectional hypothesis.