Each question is 4 points.

1. The population mean of a standardized test on Cheerfulness is 50. An attitude coach who conducts self-improvement workshops administered the test to a sample of his participants. The obtained sample mean was 55. Since the obtained sample mean was 5 points higher than the population mean can we, therefore, conclude that the workshop was effective? Why or why not?

Answer

This is because the means difference is high, and with reference to Cohen’s D we can infer that the workshop was effective

1. Assume a study is being conducted to determine if a sample mean would be significantly different from the population mean of 35. Write the symbolic notation for both the null and alternative hypotheses for
   1. a nondirectional test, and
   2. a directional test that specifies that the treatment will improve scores.

Answer

a nondirectional test –

H1 : U ≠ 35 , H0 : U = 35

a directional test that specifies that the treatment will improve scores.

H1 : U >35 , H0 : U ≤35

1. Explain why obtained sample values that fall in the critical region of a sampling distribution result in rejection of the null hypothesis.

Answer

This means that the sample values have less likelihood of occurring by chance.

1. Is it easier to reject a null hypothesis with a one-tailed test or a two-tailed test? Please explain.

Answer

It can be stated that is it easier to reject a null hypothesis with a one tail when compared to a two-tail test. However, when a two-tail test is been specified, the alpha level has to be divided by two, making it more difficult to reject the null hypothesis for a two tailed test compared to a one tail test, where the specified alpha level is been used unadjusted.

1. If our obtained sample mean falls in the critical region of a sampling distribution, have we gained support for H0 or H1? Explain.

Answer

If our obtained sample falls in the critical region of a sampling distribution, then it our test has a probability(p-value) less than the alpha value, which means we reject the null hypothesis(H0) at the chosen significance level. That is support is not gained for Ho but rather alternative hypothesis(H1)

1. List the assumptions for the z-test of significance.

Answer

Independent and random selection of subjects.

Normal distribution of dependent variable in the population

Standard deviation is known

1. Explain what is meant by Type I error. How can researchers reduce the risk of making such an error?

Answer

Type I error is rejecting a null hypothesis that is in reality true.

This type of error can be reduced by minimizing the significance level of a hypothesis test. Thus, since the level of significance is chosen by the researcher, the level can be changed.

1. Explain what is meant by the power of a statistical test. What are the factors that increase power?

Power of a statistical test is the probability that a statistical test to reject a null hypothesis that is in fact false.

The factors that increase power include.

Alpha level

Directionality of alternative hypothesis

Sample size

Variability of the data

1. One of the founders of a society for skeptics believes that people would benefit from a more questioning attitude about various claims that people make, and he has developed a course to teach such skills. A standardized skepticism assessment has a μ = 90 and a σ = 20. A sample of n = 40 is obtained from students who have taken his course and their mean is M = 99.
   1. Employ the four-step hypothesis testing procedure to determine the effectiveness of the course using a two-tailed z-test and an α = .01.
   2. If a significant difference was found, determine the size of the effect.

Answer

1. μ = 90 σ = 20 n = 40 M = 99

Employ the four-step hypothesis testing procedure to determine the effectiveness of the course using a two-tailed z-test and an α = .01.

STEP1: Formulate the hypothesis

: μ = 90 (Null hypothesis)

: μ ≠ 90 (Alternative Hypothesis)

STEP2: Indicate the alpha levels and critical values

α = .01 which resulted from.

1-0.98 =0.02

This is a two-tail test (α/2) = 0.02/2= .01

From the Z table the critical values = ±2.326 for 98% confidence level.

STEP3: Calculate the relevant statistics

**σm = σ/sqrt of n = (M – u)/ σm**

= 20/ **sqrt of 40 = (99-90)/3.16**

**= 3.16 = + 2.85**

STEP 4: Decide and report the results.

From the above test our  **value is greater than our z critical value, which means that we reject our null hypothesis and accept the alternative hypothesis.**

Reject ,  **= + 2.85, p<.01**

**The new course made a significant effect**

b. If a significant difference was found, determine the size of the effect.

Answer,

Size of effect can be determined by using Cohens D.

= |M-U|/σ

= (99-90)/20

= 0.45

This means that the size of the effect was small, Cohens D value lies between .20 and .49

1. Balance disturbances can be a common source of difficulty for senior citizens. One type of balance test involves standing on one leg, arms crossed and eyes open. The population mean for females, aged 60 - 69, on the balance test is 30 seconds with a σ = 5 seconds. A fitness instructor is implementing a program at her facility, which she calls “Toe the Line,” designed to improve balancing skills. After completing the program, a sample of 15 females in the 60 - 69 age group take the balance test. The mean for the sample was M = 32. Using a one-tailed z-test and α = .05, determine whether the program improved balancing skills in older females.

Answer

M= 32 α= .05 σ = 5 μ = 30 N= 15

STEP1: Formulate the hypothesis

: μ = 30 (Null hypothesis)

: μ ≠ 30 (Alternative Hypothesis)

STEP2: Indicate the alpha levels and critical values

α = .05 which resulted from.

1-0.95 =0.05

This is a one-tail test = 0.05 (95% confidence level)

From the Z table the critical values = ±1.645 for 95% confidence level.

STEP3: Calculate the relevant statistics

**σm = σ/sqrt of n = (M – u)/ σm**

= 5/ **sqrt of 15 = (32-30)/1.29**

**= 1.29 = + 1.55**

STEP 4: Decide and report the results.

From the above test our  **value is less than our z critical value, which means that we fail to reject our null hypothesis, p is greater than our alpha level.**

Fail to Reject ,  **= + 1.55, p>.05**