Question #1 of 34

Question ID: 1572880

Which of the following statements about parametric and nonparametric tests is *least* accurate?

A) Nonparametric tests rely on population parameters.

B) The test of the difference in means is used when you are comparing means from two independent samples.

C) The test of the mean of the differences is used when performing a paired comparison.

Explanation

Nonparametric tests are not concerned with parameters; they make minimal assumptions about the population from which a sample comes. It is important to distinguish between the test of the difference in the means and the test of the mean of the differences. Also, it is important to understand that parametric tests rely on distributional assumptions, whereas nonparametric tests are not as strict regarding distributional properties.

(Module 8.2, LOS 8.c)

Question #2 of 34

Question ID: 1572868

A survey is taken to determine whether the average starting salaries of CFA charterholders is equal to or greater than $54,000 per year. Assuming a normal distribution, what is the test statistic given a sample of 75 newly acquired CFA charterholders with a mean starting salary of $57,000 and a standard deviation of $1,300?

A) -19.99.

B) 19.99.

C) 2.31.

Explanation

With a large sample size (75) the z-statistic is used. The z-statistic is calculated by subtracting the hypothesized parameter from the parameter that has been estimated and dividing the difference by the standard error of the sample statistic. Here, the test statistic = (sample mean – hypothesized mean) / (sample standard deviation / (sample size)$^{1/2}$ = (X – μ) / (σ / $n^{1/2}$) = (57,000 – 54,000) / (1,300 / $75^{1/2}$) = (3,000) / (1,300 / 8.66) = 19.99.

(Module 8.2, LOS 8.b)

Question #3 of 34

Question ID: 1572881

A test of whether a mutual fund's performance rank in one period provides information about the fund's performance rank in a subsequent period is *best* described as a:

A) mean-rank test.

B) nonparametric test.

C) parametric test.

Explanation

A rank correlation test is best described as a nonparametric test.

(Module 8.2, LOS 8.c)

Question #4 of 34

Question ID: 1572873

Kyra Mosby, M.D., has a patient who is complaining of severe abdominal pain. Based on an examination and the results from laboratory tests, Mosby states the following diagnosis hypothesis: H_o: Appendicitis, H_A: Not Appendicitis. Dr. Mosby removes the patient's appendix and the patient still complains of pain. Subsequent tests show that the gall bladder was causing the problem. By taking out the patient's appendix, Dr. Mosby:

A) made a Type II error.

B) made a Type I error.

C) is correct.

Explanation

This statement is an example of a Type II error, which occurs when you fail to reject a hypothesis when it is actually false.

The other statements are incorrect. A Type I error is the rejection of a hypothesis when it is actually true.

(Module 8.2, LOS 8.b)

Question #5 of 34

Question ID: 1572876

If an analyst wants to perform hypothesis testing using a chi-square test, which of the following values is he *most likely* assessing?

A) The value of a population mean.

B) The value of a population variance.

C) Whether two population variances are equal.

Explanation

A chi-square test is a hypothesis test used to assess the value of a population variance. The value of a population mean will use either a t-test (for a small sample) or a z-test (for a large sample). An F-test can be used to assess the equality of two population variances.

(Module 8.2, LOS 8.b)

Question #6 of 34

Question ID: 1572857

Which of the following statements about hypothesis testing is *least* accurate?

A) A Type I error is the probability of rejecting the null hypothesis when the null hypothesis is false.

B) The significance level is the probability of making a Type I error.

C) A Type II error is the probability of failing to reject a null hypothesis that is not true.

Explanation

A Type I error is the probability of rejecting the null hypothesis when the null hypothesis is true.

(Module 8.1, LOS 8.a)

Question #7 of 34

Question ID: 1572870

A survey is taken to determine whether the average starting salaries of CFA charterholders is equal to or greater than $59,000 per year. What is the test statistic given a sample of 135 newly acquired CFA charterholders with a mean starting salary of $64,000 and a standard deviation of $5,500?

A) 0.91.

B) 10.56.

C) -10.56.

Explanation

With a large sample size (135) the *z*-statistic is used. The *z*-statistic is calculated by subtracting the hypothesized parameter from the parameter that has been estimated and dividing the difference by the standard error of the sample statistic. Here, the test statistic = (sample mean – hypothesized mean) / (population standard deviation / (sample size)$^{1/2}$) = (X − μ) / (σ / n$^{1/2}$) = (64,000 – 59,000) / (5,500 / 135$^{1/2}$) = (5,000) / (5,500 / 11.62) = 10.56.

(Module 8.2, LOS 8.b)

Question #8 of 34

Question ID: 1572867

A survey is taken to determine whether the average starting salaries of CFA charterholders is equal to or greater than $57,000 per year. Assuming a normal distribution, what is the test statistic given a sample of 115 newly acquired CFA charterholders with a mean starting salary of $65,000 and a standard deviation of $4,500?

A) 1.78.

B) 19.06.

C) -19.06.

Explanation

With a large sample size (115) the z-statistic is used. The z-statistic is calculated by subtracting the hypothesized parameter from the parameter that has been estimated and dividing the difference by the standard error of the sample statistic. Here, the test statistic = (sample mean – hypothesized mean) / (population standard deviation / (sample size)$^{1/2}$ = (X − μ) / (σ / n$^{1/2}$) = (65,000 – 57,000) / (4,500 / 115$^{1/2}$) = (8,000) / (4,500 / 10.72) = 19.06.

(Module 8.2, LOS 8.b)

Question #9 of 34

Question ID: 1572861

If a two-tailed hypothesis test has a 5% probability of rejecting the null hypothesis when the null is true, it is *most likely* that:

A) the probability of a Type I error is 2.5%.

B) the power of the test is 95%.

C) the confidence level of the test is 95%.

Explanation

Rejecting the null hypothesis when it is true is a Type I error. The probability of a Type I error is the significance level of the test and one minus the significance level is the confidence level. The power of a test is one minus the probability of a Type II error, which cannot be calculated from the information given. (Module 8.1, LOS 8.a)

Question #10 of 34

Question ID: 1572851

If a two-tailed hypothesis test has a 5% probability of rejecting the null hypothesis when the null is true, it is *most likely* that the:

A) power of the test is 95%.

B) significance level of the test is 5%.

C) probability of a Type I error is 2.5%.

Explanation

Rejecting the null hypothesis when it is true is a Type I error. The probability of a Type I error is the significance level of the test. The power of a test is one minus the probability of a Type II error, which cannot be calculated from the information given.

(Module 8.1, LOS 8.a)

Question #11 of 34

Question ID: 1572879

Lucy James, CFA, is constructing a hypothesis test using a 5% level of significance. If she is interested in increasing the "power of the test," she should consider:

A) lowering the level of significance.

B) keeping the significance level the same and increasing the sample size.

C) increasing the probability of a Type II error.

Explanation

A Type I error, which is equivalent to the level of significance, is the probability of incorrectly rejecting a true null hypothesis. A Type II error is the probability of incorrectly not rejecting a false null hypothesis. The "power of the test" is equal to 1 minus the probability of a Type II error and represents the probability of correctly rejecting a false null hypothesis.

To increase the power of the test, James could keep the significance level the same and increase the sample size. Lowering the level of significance will reduce the probability of a Type I error, increase the probability of a Type II error, and decrease the power of the test. Increasing the probability of a Type II error will decrease the power of the test.

(Module 8.2, LOS 8.b)

Question #12 of 34

Question ID: 1572849

If the probability of a Type I error decreases, then the probability of:

A) incorrectly accepting the null decreases. ✗

B) incorrectly rejecting the null increases. ✗

C) a Type II error increases. ✓

Explanation

If P(Type I error) decreases, then P(Type II error) increases. A null hypothesis is never accepted. We can only fail to reject the null.

(Module 8.1, LOS 8.a)

Question #13 of 34

Question ID: 1572848

Which of the following statements about hypothesis testing is *most accurate*?

A) A Type I error is rejecting the null hypothesis when it is true, and a Type II error is rejecting the alternative hypothesis when it is true. ✗

B) A hypothesis that the population mean is less than or equal to 5 should be rejected when the critical Z-statistic is greater than the sample Z-statistic. ✗

C) A hypothesized mean of 3, a sample mean of 6, and a standard error of the sampling means of 2 give a sample Z-statistic of 1.5. ✓

Explanation

Z = (6 - 3)/2 = 1.5. A Type II error is failing to reject the null hypothesis when it is false. The null hypothesis that the population mean is less than or equal to 5 should be rejected when the sample Z-statistic is greater than the critical Z-statistic.

(Module 8.1, LOS 8.a)

Question #14 of 34

Question ID: 1572863

The power of the test is:

A) the probability of rejecting a true null hypothesis. ✗

B) equal to the level of confidence. ✗

C) the probability of rejecting a false null hypothesis. ✓

Explanation

This is the definition of the power of the test: the probability of correctly rejecting the null hypothesis (rejecting the null hypothesis when it is false).

(Module 8.1, LOS 8.a)

Question #15 of 34

Question ID: 1572860

If a one-tailed *z*-test uses a 5% significance level, the test will reject a:

A) true null hypothesis 95% of the time. ✗

B) true null hypothesis 5% of the time. ✓

C) false null hypothesis 95% of the time. ✗

Explanation

The level of significance is the probability of rejecting the null hypothesis when it is true. The probability of rejecting the null when it is false is the power of a test. (Module 8.1, LOS 8.a)

Question #16 of 34

Question ID: 1572852

A Type I error is made when the researcher:

A) rejects the null hypothesis when it is actually true.

B) rejects the alternative hypothesis when it is actually true.

C) fails to reject the null hypothesis when it is actually false.

Explanation

A Type I error is defined as rejecting the null hypothesis when it is actually true. It can be thought of as a false positive.

A Type II error occurs when a researching fails to reject the null hypothesis when it is false. It can be thought of as a false negative.

(Module 8.1, LOS 8.a)

Question #17 of 34

Question ID: 1572862

An analyst decides to select 10 stocks for her portfolio by placing the ticker symbols for all the stocks traded on the New York Stock Exchange in a large bowl. She randomly selects 20 stocks and will put every other one chosen into her 10-stock portfolio. The analyst used:

A) stratified random sampling.

B) simple random sampling.

C) dual random sampling.

Explanation

In simple random sampling, each item in the population has an equal chance of being selected. The analyst's method meets this criterion.

(Module 8.1, LOS 8.a)

Question #18 of 34

Question ID: 1572853

A Type I error:

A) fails to reject a false null hypothesis.

B) rejects a true null hypothesis.

C) rejects a false null hypothesis.

Explanation

A Type I Error is defined as rejecting the null hypothesis when it is actually true. The probability of committing a Type I error is the significance level or alpha risk.

(Module 8.1, LOS 8.a)

Question #19 of 34

Question ID: 1572877

A financial analyst is constructing a hypothesis test to assess whether the mean daily return on a portfolio of blue-chip stocks is statistically different from zero. The sample size is 128 trading days, the mean return is 0.14%, and the standard deviation is 0.18%. With the null hypothesis that the daily portfolio return is equal to zero, which of the following changes in variables will independently make it more likely that the null is rejected?

A) An increase in the standard deviation of the returns to 0.23%. ✗

B) A move of the mean return down to 0.11%. ✗

C) An increase in the sample size to 140. ✓

Explanation

Even though numbers are provided, no calculations are needed. An increase in the sample size will produce a lower standard error, and a lower standard error will equate to a higher test statistic. Note that all numbers provided are positive, such that the critical value will be a positive number. The higher the test statistic is relative to the critical value, the more likely it is that the null hypothesis is rejected.

A decrease in the mean return will lower the test statistic, while an increase in the standard deviation will increase the standard error (which will decrease the test statistic).

(Module 8.2, LOS 8.b)

Question #20 of 34

Question ID: 1572869

A survey is taken to determine whether the average starting salaries of CFA charterholders is equal to or greater than $58,500 per year. What is the test statistic given a sample of 175 CFA charterholders with a mean starting salary of $67,000 and a standard deviation of $5,200?

A) 1.63. ✗

B) –1.63. ✗

C) 21.62. ✓

Explanation

With a large sample size (175) the *z*-statistic is used. The *z*-statistic is calculated by subtracting the hypothesized parameter from the parameter that has been estimated and dividing the difference by the standard error of the sample statistic. Here, the test statistic = (sample mean – hypothesized mean) / (population standard deviation / (sample size)$^{1/2}$ = $(X - \mu) / (\sigma / n^{1/2}) = (67{,}000 - 58{,}500) / (5{,}200 / 175^{1/2}) = (8{,}500) / (5{,}200 / 13.22) = 21.62$.

(Module 8.2, LOS 8.b)

Question #21 of 34

Question ID: 1572854

Which of the following statements regarding hypothesis testing is *least* accurate?

A) The significance level is the risk of making a type I error.

B) A type I error is acceptance of a hypothesis that is actually false.

C) A type II error is the acceptance of a hypothesis that is actually false.

Explanation

A type I error is the rejection of a hypothesis that is actually true.

(Module 8.1, LOS 8.a)

Question #22 of 34

Question ID: 1572865

An analyst calculates that the mean of a sample of 200 observations is 5. The analyst wants to determine whether the calculated mean, which has a standard error of the sample statistic of 1, is significantly different from 7 at the 5% level of significance. Which of the following statements is *least* accurate?:

A) The null hypothesis would be: H_0: mean = 7.

B) The alternative hypothesis would be H_a: mean > 7.

C) The mean observation is significantly different from 7, because the calculated Z-statistic is less than the critical Z-statistic.

Explanation

The way the question is worded, this is a two tailed test. The alternative hypothesis is not H_a: M > 7 because in a two-tailed test the alternative is =, while < and > indicate one-tailed tests. A test statistic is calculated by subtracting the hypothesized parameter from the parameter that has been estimated and dividing the difference by the standard error of the sample statistic. Here, the test statistic = (sample mean – hypothesized mean) / (standard error of the sample statistic) = (5 - 7) / (1) = -2. The calculated Z is -2, while the critical value is -1.96. The calculated test statistic of -2 falls to the left of the critical Z-statistic of -1.96, and is in the rejection region. Thus, the null hypothesis is rejected and the conclusion is that the sample mean of 5 is significantly different than 7. What the negative sign shows is that the mean is less than 7; a positive sign would indicate that the mean is more than 7. The way the null hypothesis is written, it makes no difference whether the mean is more or less than 7, just that it is not 7.

(Module 8.2, LOS 8.b)

Question #23 of 34

Question ID: 1572878

Bo Rigley, CFA, is a financial analyst examining large-cap equity returns over a calendar year. His sample size is 252 trading days, and he observes a mean return of 0.07% and a standard deviation of 0.12%. With his null hypothesis that the daily portfolio return is equal to zero and a 10% level of significance, Rigley will:

A) reject the null because the test statistic is greater than the critical value. ✓

B) not reject the null because the test statistic is less than the critical value. ✗

C) not reject the null because the test statistic is greater than the critical value. ✗

Explanation

At a 10% level of significance, the critical z-values for a two-tailed test are + or –1.645, so the decision rule is to reject the null if the test statistic < –1.645 or > +1.645.

With a sample size of 252 and a standard deviation of 0.12%, the standard error is equal to:

$$S_{\bar{x}} = \frac{s}{\sqrt{n}} = \frac{0.12\%}{\sqrt{252}} = 0.0075593\%$$

The test statistic is equal to:

$$\frac{0.0007}{0.000075593} = 9.26$$

Because the test statistic of 9.26 > 1.645, Rigley will reject the null that the daily equity return is equal to zero.

(Module 8.2, LOS 8.b)

Question #24 of 34

Question ID: 1572858

Which of the following statements about hypothesis testing is *most* accurate? A Type I error is the probability of:

A) rejecting a true null hypothesis.

B) failing to reject a false hypothesis.

C) rejecting a true alternative hypothesis.

Explanation

The Type I error is the error of rejecting the null hypothesis when, in fact, the null is true.

(Module 8.1, LOS 8.a)

Question #25 of 34

Question ID: 1572874

For a hypothesis test regarding a population parameter, an analyst has determined that the probability of failing to reject a false null hypothesis is 18%, and the probability of rejecting a true null hypothesis is 5%. The power of the test is:

A) 0.95.

B) 0.18.

C) 0.82.

Explanation

The power of the test is 1 – the probability of failing to reject a false null (Type II error); 1 – 0.18 = 0.82.

(Module 8.2, LOS 8.b)

Question #26 of 34

Question ID: 1572859

Which of the following statements about hypothesis testing is *least* accurate?

A) If the alternative hypothesis is H_a: $\mu > \mu_0$, a two-tailed test is appropriate.

B) A Type II error is failing to reject a false null hypothesis.

C) The null hypothesis is a statement about the value of a population parameter.

Explanation

The hypotheses are always stated in terms of a population parameter. Type I and Type II are the two types of errors you can make – reject a null hypothesis that is true or fail to reject a null hypothesis that is false. The alternative may be one-sided (in which case a > or < sign is used) or two-sided (in which case a ≠ is used).

(Module 8.1, LOS 8.a)

Question #27 of 34

Question ID: 1572864

Which of the following statements about hypothesis testing is *most* accurate?

A) The probability of a Type I error is equal to the significance level of the test. ✓

B) The power of a test is one minus the probability of a Type I error. ✗

C) If you can disprove the null hypothesis, then you have proven the alternative hypothesis. ✗

Explanation

The probability of getting a test statistic outside the critical value(s) when the null is true is the level of significance and is the probability of a Type I error. The power of a test is 1 minus the probability of a Type II error. Hypothesis testing does not prove a hypothesis, we either reject the null or fail to reject it.

(Module 8.1, LOS 8.a)

Question #28 of 34

Question ID: 1572871

Ron Jacobi, manager with the Toulee Department of Natural Resources, is responsible for setting catch-and-release limits for Lake Norby, a large and popular fishing lake. He takes a sample to determine whether the mean length of Northern Pike in the lake exceeds 18 inches. If the sample t-statistic indicates that the mean length of the fish is significantly greater than 18 inches, when the population mean is actually 17.8 inches, the t-test resulted in:

A) both a Type I and a Type II error. ✗

B) a Type II error only. ✗

C) a Type I error only. ✓

Explanation

Rejection of a null hypothesis when it is actually true is a Type I error. Here, H_o: μ ≤ 18 inches and H_a: μ > 18 inches. Type II error is failing to reject a null hypothesis when it is actually false.

Because a Type I error can only occur if the null hypothesis is true, and a Type II error can only occur if the null hypothesis is false, it is logically impossible for a test to result in both types of error at the same time.

(Module 8.2, LOS 8.b)

Question #29 of 34

Question ID: 1572855

A Type II error:

A) rejects a true null hypothesis.

B) fails to reject a false null hypothesis.

C) fails to reject a true null hypothesis.

Explanation

A Type II error is defined as accepting the null hypothesis when it is actually false. The chance of making a Type II error is called beta risk.

(Module 8.1, LOS 8.a)

Question #30 of 34

Question ID: 1572875

A data analyst compares the P/E ratios for two companies over a period of 20 years and calculates a two-tailed *F*-statistic that exceeds the critical *F*-statistic value. As a result of her findings, she will:

A) not reject the null hypothesis that the P/E ratio variances between the two companies are significantly different.

B) reject the null hypothesis that the P/E ratio variances between the two companies are significantly different.

C) reject the null hypothesis that the P/E ratio variances between the two companies are not significantly different.

Explanation

The F-test is used to assess the equality of two population variances. Here, the comparison is between two companies' P/E ratios over a period of 20 years. The null hypothesis for the two-tailed test is that the variances are not significantly different, while the alternative hypothesis is that they are significantly different.

Because the calculated *F*-statistic is higher than the critical *F*-statistic value, the null hypothesis will be rejected.

(Module 8.2, LOS 8.b)

Question #31 of 34

Question ID: 1572856

John Jenkins, CFA, is performing a study on the behavior of the mean P/E ratio for a sample of small-cap companies. Which of the following statements is *most* accurate?

A) A Type I error represents the failure to reject the null hypothesis when it is, in fact, false. ✗

B) One minus the confidence level of the test represents the probability of making a Type II error. ✗

C) The significance level of the test represents the probability of making a Type I error. ✓

Explanation

A Type I error is the rejection of the null when the null is actually true. The significance level of the test (alpha) (which is one minus the confidence level) is the probability of making a Type I error. A Type II error is the failure to reject the null when it is actually false.

(Module 8.1, LOS 8.a)

Question #32 of 34

Question ID: 1572850

Which of the following statements about hypothesis testing is *most* accurate? A Type II error is the probability of:

A) failing to reject a false null hypothesis. ✓

B) rejecting a true alternative hypothesis. ✗

C) rejecting a true null hypothesis. ✗

Explanation

The Type II error is the error of failing to reject a null hypothesis that is not true.

(Module 8.1, LOS 8.a)

Question #33 of 34

Question ID: 1572866

A researcher is testing whether the average age of employees in a large firm is statistically different from 35 years (either above or below). A sample is drawn of 250 employees and the researcher determines that the appropriate critical value for the test statistic is 1.96. The value of the computed test statistic is 4.35. Given this information, which of the following statements is *least* accurate? The test:

A) indicates that the researcher will reject the null hypothesis. ✗

B) has a significance level of 95%. ✓

C) indicates that the researcher is 95% confident that the average employee age is different than 35 years. ✗

Explanation

This test has a *significance level of 5%.* The relationship between confidence and significance is: significance level = 1 – confidence level. We know that the significance level is 5% because the sample size is large and the critical value of the test statistic is 1.96 (2.5% of probability is in both the upper and lower tails).

(Module 8.2, LOS 8.b)

Question #34 of 34

Question ID: 1572872

For a two-tailed test of hypothesis involving a z-distributed test statistic and a 5% level of significance, a calculated z-statistic of 1.5 indicates that:

A) the null hypothesis cannot be rejected. ✓

B) the test is inconclusive. ✗

C) the null hypothesis is rejected. ✗

Explanation

For a two-tailed test at a 5% level of significance the calculated z-statistic would have to be greater than the critical z value of 1.96 for the null hypothesis to be rejected.

(Module 8.2, LOS 8.b)