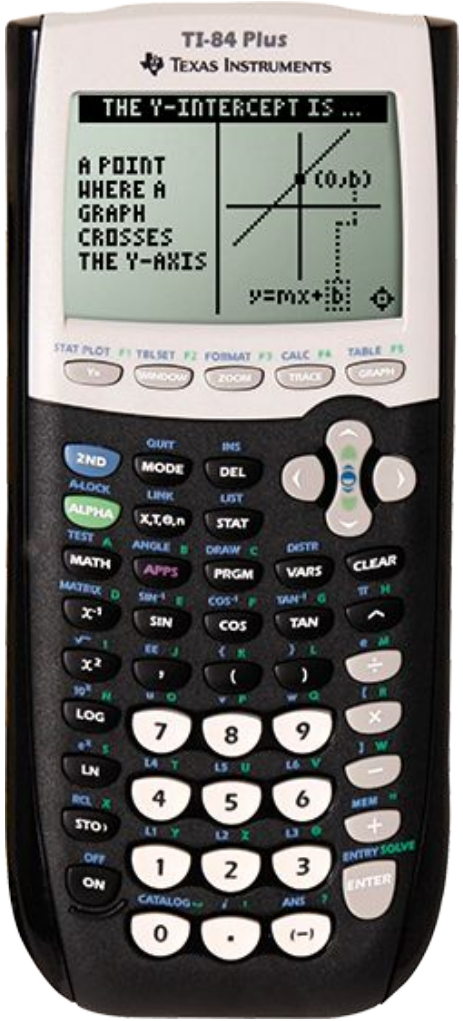
Test Prep 4

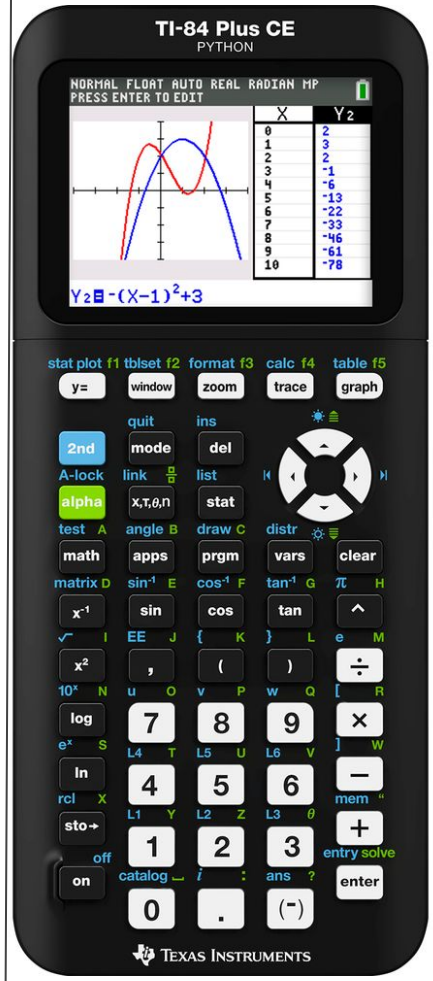
Unit 4 additional questions



NORMAL FLOAT AUTO REAL DEGREE MP

invNorm

area:
μ:0
σ:1
Paste



NORMAL FLOAT AUTO REAL RADIAN MP

invNorm

area:0.3
μ:5
σ:3
Tail: LEFT CENTER RIGHT
Paste

Question 1 (6 equivalent)

Question:

What is the probability of making a Type I error if the rejection region is defined as $t > 2.086$ with 15 degrees of freedom? Label and shade the appropriate area on the graph.

Answer

The probability of making a Type I error is approximately 0.025, or 2.5%.

Question 2 (4 equivalent)

A nutrition company claims that 20% of adults regularly take its supplements. After a new ad campaign, the company wants to test whether this proportion has increased. In a random sample of 400 adults, 98 reported using the supplements regularly. Using a 5% significance level, what is the appropriate rejection region for this test?

A) $Z < -1.645$

B) $Z > -1.645$

C) $Z < 1.645$

D) $Z > 1.645$

E) $|Z| > 1.96$

F) $|Z| > 1.645$

Answer

D) $Z > 1.645$

Question 3 (8 equivalent)

Suppose that a hypothesis test is conducted using \alpha = 0.01. If a p-value of 0.025 is observed, what conclusion will be made? Indicate your answer by circling the correct words in the parentheses.

“Since the p-value is (less/greater) than the significance level, the researcher would (reject/fail to reject) the null hypothesis.”

Answer

“Since the p-value is (greater) than the significance level, the researcher would (fail to reject) the null hypothesis.”

Question 4 (2 equivalent)

A company develops a new smartphone designed to appeal more to teenagers. Nationally, 30% of smartphone users are teenagers. To evaluate their claim, the company surveys recent buyers of their new model and finds a higher proportion of teenagers among them. Formulate the appropriate null and alternative hypotheses.

Answer

H_0: $p = 0.30$

H_1: $p > 0.30$

Question 5 (10 equivalent)

Consider a hypothesis test with Ha: p = 0.35, a sample size of n = 400, and a sample proportion p hat = 0.38. Give each of the following values:

1. The number of successes, X, out of 400.
2. The probability of failure, assuming the null hypothesis is correct.
3. The test statistic for this test of hypotheses.
4. The observed significance level (p-value) for this hypothesis test.

Answer

1. 152
2. 0.65
3. 1.26
4. 0.2076

Question 6 (1 equivalent)

1) Determine whether each quantity is a population perimeter or a sample statistic by circling the correct choice next to each symbol.

$\hat{p}$ parameter statistic

p parameter statistic

μ parameter statistic

$\bar{x}$ parameter statistic

Answer

1) Determine whether each quantity is a population perimeter or a sample statistic by circling the correct choice next to each symbol.

$\hat{p}$ parameter statistic

p parameter statistic

μ parameter statistic

$\bar{x}$ parameter statistic

Question 7 (3 equivalent)

Rejection region $Z > 1.960$ Test statistic $Z = 2.105$ Level of significance/alpha = 0.05

“We will (accept/fail to reject/reject) the null hypothesis, as there is (sufficient/insufficient) evidence at the 5% significance level.”

Answer

“We will (reject) the null hypothesis, as there is (sufficient) evidence at the 5% significance level.”

Question 8 (5 equivalent)

A battery manufacturer claims that the average lifespan of their batteries is 500 hours. A consumer group suspects that the average lifespan is less than 500 hours. They take a random sample of 30 batteries and find the average lifespan to be 490 hours with a standard deviation of 15 hours. Using a significance level of 5%, determine the appropriate rejection region for this test.

A) $t < -1.699$

B) $t > -1.699$

C) $t < 1.699$

D) $t > 1.699$

E) $|t| > 1.699$

F) $|t| < 1.699$

Answer

A) $t < -1.699$

Question 9 (7 equivalent)

A researcher believes that a new type of soil will result in heavier tomatoes. The average weight of mature tomatoes of this variety is known to be 200 grams. Assume that the weights are approximately normally distributed. The researcher grows a sample of seven tomatoes using the new soil and records their weights (in grams):

215, 225, 210, 230, 220, 215, 240

A) Determine the values of x bar, S, and n.

B) Use the appropriate formulas or statistical calculator functions to perform the test of hypothesis. Report the test statistic and p-value.

C) Based on the sample and using \alpha = 0.05, what conclusion should the researcher make about whether the new soil results in heavier tomatoes?

Answer

A) Values of $\bar{X}$, S, and n:

- $n = 7$
- $\bar{X} \approx 223.57$ grams
- $S \approx 11.55$ grams

B) Test statistic and p-value:

- **Test statistic**:

$$t = \frac{\bar{X} - \mu_0}{S/\sqrt{n}} = \frac{223.57 - 200}{11.55/\sqrt{7}} \approx \frac{23.57}{4.37} \approx 5.39$$

- **Degrees of freedom**: $df = 6$
- **P-value** (one-tailed test):
$p \approx 0.0007$

C) Conclusion at $\alpha = 0.05$:

Since $p < 0.05$, we **reject** the null hypothesis.

Conclusion: There is **sufficient evidence** to conclude that the new
soil results in heavier tomatoes.

Question 10 (9 equivalent)

Here's a similar question based on the same structure and concepts:

Similar Question:

A fitness program claims that participants lose an average of 15 pounds after completing the program. A health researcher suspects that the actual average weight loss is different from 15 pounds. In a sample of 50 participants, the average weight loss was 13.2 pounds with a sample standard deviation of 4.8 pounds.

A) Determine the direction of the hypothesis test (circle the correct answer):

Left tailed Right tailed Two tailed

B) Use statistical formulas or a calculator to calculate the test statistic for this hypothesis test:

Test statistic = _____

C) Based on this sample and using a 5% level of significance (\alpha = 0.05), what would the researcher conclude about whether the actual mean weight loss is different from 15 pounds?

Yes No

Answer

A) Two tailed

B) Test statistic = -2.65

C) Reject