Workbook

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Hypothesis Testing and Errors

Hypothesis Testing

Questions

1) A national magazine indicates that 8% of college students in the US pledge Greek. Suppose you have a hypothesis that colleges in the Southeast have a higher rate of pledging Greek. You randomly sample 50 students from colleges in the Southeast and find that 5 of them pledged Greek.

    a. What is the null hypothesis?

    b. What is the alternative hypothesis?

2) The expected time before a painkiller starts working is distributed normally with a mean of 40 minutes and a standard deviation of 12 minutes.
A company is attempting to shortening this time with a new drug.
The company decided in advance that if the average time was less than 35 minutes, it would continue marketing the drug.

    a. What are the null and alternative hypotheses?

    b. What is the proposed test's level of significance?

3) We want to check whether men receive preferential treatment in admissions to a business faculty. We randomly sample 200 students.
Researcher A sets a 5% level of significance, and researcher B decides to accept the research claim if there are at least 120 admitted males in the sample.
Which of the two researchers has a higher level of significance?

Answer Key

1) a. H_0: $P = 0.08$ b. H_a: $P > 0.08$

2) a. H_0: $x = 40$, H_a: $x > 40$ b. 0.0188

3) Researcher A: $\alpha = 0.05$.

Errors

Questions

1) A person is suspected of a crime.
What kinds of errors can occur in the verdict?

2) The duration of the effectiveness of a painkiller is distributed normally with a mean of 40 minutes and a standard deviation of 12 minutes.
The company thinks it has a better version.
25 random patients had an average duration of 34.5 minutes.
The company decided in advance that if the average durationis less than 35 minutes, it will continue marketing the drug as an improvement.
Based on the sample results, what is the conclusion?
What is the possible error in the conclusion?

3) An IQ exam has scores that are distributed normally with a standard deviation of 120.
A test-prep center claimsthat their customers increase their score by over 30 points.
20 of their customers and 20 other students were sampled.
An ad agency decides to accept the institute's claim only if the sample average of the customers is at least 50 points higher.
Suppose the test-prep center increased the average score by 60 points.
What are the chances of a Type II error?

Answer Key:

1) When he's guilty, but the verdict's decision is innocent, and vice versa.

2) Reject H_0 and accept H_1,   1.1% chance of type I error.

3) 0