

HOMEWORK for *t*-test for a single mean

No StatTool data for this homework

For the problem below: (a) state the Scientific Hypothesis and skeptical-scientific hypothesis. Also state the PCH of chance. (b) Is the sci hyp directional or non-directional? Why? (c) Translate the sci hyp and the PCH into statistical hypotheses--that is, state H_0 and H_1 . (d) Name the test statistic you will use to decide between the statistical hypotheses. (e) What is the alpha level (level of significance, p -value) that you will use? (f) In your own words what does this p -value mean? (g) Calculate your df. (h) Is H_1 one- or two-tailed? Why? (i) Look up the critical value (or values) in the table in your book. (j) Draw a line representing the range of your test statistic. What is the center value predicted by H_0 ; draw it on the line? Also draw in the critical value (or values) on the line. Label the "Reject H_0 " region (or regions). Label the "Do not reject H_0 " region. (k) Why does H_0 predict a value of zero for your test statistic?

NOW FOR THE DATA:

(L) Does the pattern of data favor the scientific or skeptical-scientific hypothesis? (m) Now calculate the value of your test statistic from the data. Take this calculated value of your test statistic and put on the drawing you made in (j). Does it fall in a rejection region? (n) Do you reject H_0 or not? (o) Verbally summarize the issue of statistical conclusion validity (PCH of chance) in this case. That is, do you think this study has statistical conclusion validity or not?

1. The national average for the verbal part of the SAT is 500. In 1978 and 1979 high schools in Mautaket County, South Dakota all offered a special verbal enrichment course that was required of all juniors and seniors. The head of the school board thought that this verbal enrichment class would produce higher scores of verbal ability on the SAT test.

In 1979 the 122 Mautaket County seniors who took the verbal portion of the SAT averaged 538 with a standard deviation of 110.

The head of the school board brings these results to you. She wants to know if the results support her ideas and if they have statistical conclusion validity.

t. for single means.

la. scientific: verbal enrichment will improve scores above the national average (500)
skeptical: there will be no improvement in scores, still at the national average (500)
"Part of chance" Results favoring scientific hypothesis are due to chance alone.

b. directional, specifying that they do better

c. $H_0: E(M) = 500$
 $H_1: E(M) > 500$

d. t-test for single mean

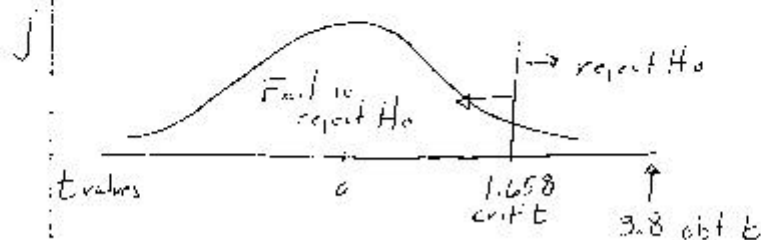
e. .05

f. Probability of rejecting H_0 when it is true.

g. df. $n-1 = 127-1 = 126$

h. one tailed, scientific hypothesis is directional

i. $\text{crit } t(126)_{.05}^{\text{one}} = 1.658$



K. There will be no difference due to enrichment!
so the mean will be equal to the national
average

L. Scientific

$$\begin{aligned} M. t &= \frac{M - E(M|H_0)}{S/\sqrt{N-1}} \\ &= \frac{538 - 500}{14/\sqrt{122-1}} \\ &= 3.8 \end{aligned}$$

N. Reject H_0

O. Probability less than 1 in 20 therefore PCH
of chance is improbable and therefore implaus. bl.

