

STA 102 Fall01  Section __________  Name: _______________


Quiz 8

In one study to investigate saliva cotinine levels as an indicator of smoking, 7 subjects were required to smoke a single cigarette. Cotinine measurements were obtained at 12 and 24 hours for each subject (in the S-plus output these are recorded in the variables C12 and C24 respectively). The investigators would like to show that the mean cotinine levels decrease over time.

Based on the S-Plus output and information above answer the following questions.

a) The null hypothesis is (please circle one)

\[ H_0: \mu_{12} = \mu_{24} \]

b) The appropriate degrees of freedom to use in a test of the null hypothesis are

i) 13  ii) 12  iii) 5  iv) 6  v) 7  vi) 14

c) The person running the analysis used an alternative hypothesis that the difference in means was not equal to zero. Based on this, what conclusion should you draw if \( \alpha = 0.01 \)?

Since the p-value is 0.0159, which is greater than \( \alpha = 0.0 \), we would not reject the null hypothesis.

d) If the alternative hypothesis is really that the cotinine levels decrease over time, then the correct p-value should be ________? (draw a picture to show how you would find the p-value) What would your conclusion be?

Since it is one sided, and the difference of sample means supports the alternative, the p-value is 0.0159/2.

Therefore we would reject the null.

e) Using the correct output/analysis, circle all that are true: none are true

i) There is a 95% chance that the difference in sample means is not zero.
ii) There is a 95% chance that the difference in population means is not zero.
iii) Ninety-five percent of the cotinine levels at 12 hours are less than the cotinine levels at 24 hours.
iv) We are 95% confident that the mean decrease in cotinine levels from 12 hours to 24 hours is 39.4 nmol/l
v) We are 95% confident that the mean decrease in cotinine levels from 12 to 24 hours is between 0.6 to 78.3 nmol/l.
vi) There is a 0.95 probability that the decrease in cotinine levels from 12 hours to 24 hours is between 10.3 to 68.5 nmol/l.
S-Plus Output

Paired t-Test
data: x: C24 in cotine, and y: c12 in cotine
t = -3.3228, df = ?, p-value = 0.0159
alternative hypothesis: true mean of differences is not equal to 0
95 percent confidence interval:
-68.46371 -10.39344
sample estimates:
mean of x - y
-39.42857

Standard Two-Sample t-Test
data: x: C24 in cotine, and y: c12 in cotine
t = -2.21, df = ?, p-value = 0.0473
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-78.3006514 -0.5564915
sample estimates:
mean of x mean of y
30.42857 69.85714