MA677
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HW8

Snodgrass Problem In 1861, 10 essays appeared in the New Orleans Daily Crescent. They were signed "Quintus Curtuis Snodgrass" and some people suspected they were actually written by Mark Twain. To investigate this, we will consider the proportion of three letter words found in an author's work.

From eight Twain essays we have:

.225 .262 .217 .240 .230 .229 .235 .217

From 10 Snodgrass essays we have:

.209 .205 .196 .210 .202 .207 .224 .223 .220 .201

Use a permutation test the equality of the means. What is your conclusion?

1. Test the equality of the means with a parametric test.
2. Test the equality of the means with a permutation test.

1.

set x = proportion of 3 letter words in Twain essays.

y = proportion of 3 letter words in Snodgrass essays

$\bar{x} = 0.2319$, $\bar{y} = 0.2097$

wald statistics $W_T = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{s_x^2}{8} + \frac{s_y^2}{10}}} = 3.7$

$P(|Z| > 3.7) = 0.0002 < .05 \Rightarrow$ reject.

2.

pvalue $= 0.021 \Rightarrow$ reject.

Problems from the t-test notes

Hot dog problem (8) Do the problem using the t distribution. Then calculate a 90% confidence interval using the permutation distribution.

$\mu = \frac{\Sigma x}{n} = 156.6$.

$\hat{\sigma_x}^2 = \frac{\Sigma(x-\bar{x})^2}{n-1} = 512.6$

$\frac{\hat{\sigma}_x}{\sqrt{n}} = 5.06$

$\phi^{-1}_{df=19}(1-\alpha) = \phi^{-1}(95\%) = 1.729$

CI: $\mu \pm 1.729$

Reading score problem (12)

Do the t-test specified in the problem. Then test the hypothesis with a permutation test.

$H_0: \mu_1 \geq \mu_2$

$t_{df\,12} = \frac{\sqrt{(m+n-2)}\,(\bar{x}_n - \bar{y}_n)}{\sqrt{\frac{1}{m}+\frac{1}{n}}\sqrt{(s_x^2+s_y^2)}} = -1.69 < -(t_{12}(90\%)) = -1.365$

$\Rightarrow$ reject H_0.