Panel 1

Stats Tests	test for μ	test for difference of mean	test of independence
1) H_0	$\mu = \#$	$\mu_1 = \mu_2$	two vars are independent
2) H_a	$\mu \neq \#$	$\mu_1 \neq \mu_2$	Not
3) # to compute	$t_0, z_0 = \dfrac{\bar{x} - \mu}{(s/\sqrt{n})}$	$t_0, z_0 = \dfrac{(\bar{x}_1 - \bar{x}_2) - \cancel{(\mu_1 - \mu_2)}^{0}}{s}$	$\chi^2 = \sum \dfrac{f_e - f}{f}$
4) # to lookup	large $\lvert z\rvert$: $p = 2 \cdot P(z > \lvert z_0\rvert)$; small $\lvert \#\rvert$: $t_\alpha = \#$ column + row	$s = \sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}$; large: $p = 2P(z > z_0)$; sm: $t_\alpha = \#$	stat crunch
Conclusion: a) Reject H_0: $p < \alpha$ or b) inconclusive	$\lvert t_0 \rvert > t_\alpha$	$p < \alpha$; $\lvert t_0 \rvert > t_\alpha$	p = prob. (stat crunch); $p < \alpha$

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Panel 2

Using the General Social Sciences 1996 survey data to find the average number of hours that people watched TV in the US in 1996, you find that the descriptive statistics for the variable 'tvhours' are:

N = 1000, Mean = 2.96, Standard Deviation = 2.38

At a conference you hear someone referring to the (supposed) fact that "the average American watches 3.5 hours of TV a day". Would you challenge the speaker, based on the above data (at the 0.05 level)?

$H_0: \mu = 3.5$

$H_a: \mu \neq 3.5$

$$z_0 = \frac{\bar{x} - \mu}{(s/\sqrt{n})} = \frac{(2.96 - 3.5)}{(2.38/\sqrt{1000})} = \frac{-0.54}{0.075} = -7.2$$

$$p = 2 \cdot P(z > 7.2) = 2 \cdot 0.00000267 = \text{small} < 0.05$$

YES

2

Panel 3

A group of 4 secondary education student teachers were given 2 1/2 days of training in interpersonal communication group work. The effect of such a training session on the dogmatic nature of the student teachers was measured using the scores on the "Rokeach Dogmatism test". The resulting scores were 10, 8, 12, 10. Test the hypothesis that average dogmatism test score for all secondary education student teachers is 12. Use alpha = 0.05 as usual.

$H_0: \mu = 12$

$H_a: \mu \neq 12$

$\sum x = 40, \sum x^2 = 408$

$s^2 = \frac{1}{3}\left(408 - \frac{40^2}{4}\right) = \frac{1}{3}(408 - 400) = \frac{8}{3} = 2.667$

$s = 1.63$

$t_0 = \frac{\bar{x} - 12}{s/\sqrt{4}} = \frac{10-12}{1.63/2} = \frac{-2}{1.63} \cdot 2 = -2.45$

$t_\alpha = 3.182$

(df = 3, $t_{0.025}$ column)

If $|t_0| > t_\alpha \Rightarrow$ Reject H_0

$2.45 > 3.182$ X inconclusive

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Panel 4

We are investigating whether the average life expectancy of adults is different between Blacks and Whites in the US in 1996. We use the GSS 1996 survey data to compute the following values:

Blacks: sample mean *46.1*, standard deviation *16.2*, sample size *402*
Whites: sample mean *48.8*, standard deviation *17.3*, sample size *2349*

Based on the outcome of this test, is there a significant difference in average age between the two groups? Use $\alpha = 0.05$, as usual. Make sure to state the null and alternative hypothesis that you are making when conducting the test.

$H_0: \mu_1 = \mu_2$

Conclusion: Reject H_0

$H_a: \mu_1 \neq \mu_2$

$z_0 = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{S}$, $S = \sqrt{\frac{16.2^2}{402} + \frac{17.3^2}{2349}} = \sqrt{0.78} = 0.88$

$= \frac{46.1 - 48.8}{0.88} = \frac{-2.7}{0.882} = -3.068$

$p = 2P(z > |z_0|) = 2 \cdot P(z > 3.068) = 2 \cdot 0.00135 = 0.0027$

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Panel 5

Confidence interval:

from $\bar{x} - k\, s/\sqrt{n}$

to $\bar{x} + k\, (s/\sqrt{n})$

k	large n	small n
90%	1.645	lookup df = n-1, and column.
95%	1.96	
99%	2.58	

$k = 2.262$ (in the review problem)

$\left(\dfrac{\bar{x} - \mu}{s/\sqrt{n}}\right)$

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