Chapter 9

Inferences Based on Two Samples

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Summary for H_0: $\mu_1-\mu_2=\Delta_0$

Test statistic value: $t=\dfrac{\bar{x}-\bar{y}-\Delta_0}{\sqrt{\dfrac{s_1^2}{m}+\dfrac{s_2^2}{n}}}$

$$\nu=\frac{\left(\frac{s_1^2}{m}+\frac{s_2^2}{n}\right)^2}{\frac{(s_1^2/m)^2}{m-1}+\frac{(s_2^2/n)^2}{n-1}}$$

H_a: $\mu_1-\mu_2>\Delta_0$ reject when $t\geq t_{\alpha,\nu}$ (upper-tailed test)

H_a: $\mu_1-\mu_2<\Delta_0$ reject when $t\leq -t_{\alpha,\nu}$ (lower-tailed test)

H_a: $\mu_1-\mu_2\neq\Delta_0$ reject when $t\geq t_{\alpha/2,\nu}$ or $t\leq -t_{\alpha/2,\nu}$ (two-tailed test)

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Example

Suppose we conjecture that alcohol increases reaction time to a certain signal by at least 0.2 seconds. We measure reaction time with 37 test persons. The sample mean is 1.19 seconds (with alcohol) and 0.95 seconds (without alcohol). The sample standard deviation is 0.1789 seconds (with alcohol) and 0.0197 seconds (without alcohol).

Design a test and draw conclusions with significance level 0.1 and 0.05, respectively.

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