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Chapter 9

Inferences Based on Two Samples

- 9.1 z-Tests
- 9.2 The Two-Sample t-Test
- 9.4 Difference Between Population Proportions**
- 9.5 Two-Population Variances

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Summary for $H_0: p_1 - p_2 = 0$

Test statistic value: $Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{m} + \frac{1}{n}\right)}}$

$\hat{p} = \frac{m}{m+n}\hat{p}_1 + \frac{n}{m+n}\hat{p}_2$

- $H_a: p_1 - p_2 > 0$ reject when $z \geq z_\alpha$ (**upper-tailed test**)
- $H_a: p_1 - p_2 < 0$ reject when $z \leq -z_\alpha$ (**lower-tailed test**)
- $H_a: p_1 - p_2 \neq 0$ reject when $z \geq z_{\alpha/2}$ or $z \leq -z_{\alpha/2}$ (**two-tailed test**)

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Example

Consider the following data on defendants from San Francisco County: 101 of those 191 who plead guilty were judged guilty, while 56 of those 64 who plead not guilty were judged guilty.

Does this data suggest that the proportion of all defendants who plead guilty and are sent to prison differs from the proportion who are sent to prison after pleading innocent and being found guilty? Use significance level 0.01.

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