# 10C PooledT

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# C Pooled T-test

[ToC]

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Test Statistic for t-test

$$z = \frac{\bar{X} - \bar{Y} - \Delta_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$S_1$ is estimating $\sigma_1$, and $S_2$ is estimating $\sigma_2$.

What if $\sigma_1 = \sigma_2$, but are still unknown?

## C.1 Pooled T-test

Test Statistic for t-test

$$z = \frac{\bar{X} - \bar{Y} - \Delta_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$S_1$ is estimating $\sigma_1$, and $S_2$ is estimating $\sigma_2$.

What if $\sigma_1 = \sigma_2$, but are still unknown?

$\Rightarrow$ They should be estimated by the same estimator $S_p$.

## C.2 Pooled T-test

$$z = \frac{\bar{X} - \bar{Y} - \Delta_0}{\sqrt{\frac{S_p^2}{n_1} + \frac{S_p^2}{n_2}}}$$

$$= \frac{\bar{X} - \bar{Y} - \Delta_0}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $S_p$ is sample standard deviation pooled sample.

- If assumption of $\sigma_1 = \sigma_2$ are correct, then has slightly higher power than regular t-test.
- It was somewhat popular back then, but it is not a recommended procedure now.