V28 - Hypotheses Testing – Part 4

- Use of T distribution for inference on difference in two means from independent populations

Course: Statistical Testing & Regression
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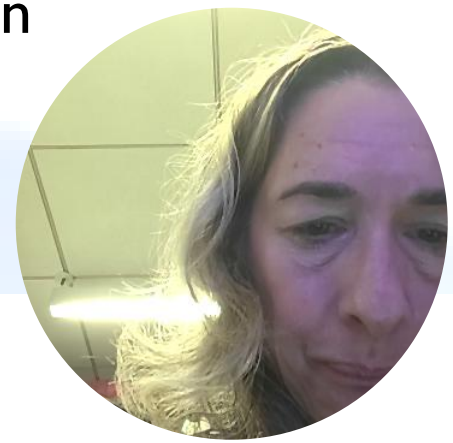

Inference on difference in two means $\mu_1 - \mu_2$ (independent populations)

- $\sigma_1{}^2$ and $\sigma_2{}^2$ unknown and n_1 and n_2 small

- We use _____

Unknown Variances but believed ${\sigma_1}^2 = {\sigma_2}^2$

- When population variances believed equal, use _____

$$\boxed{{S_p}^2 = \frac{(n_1 - 1){S_1}^2 + (n_2 - 1){S_2}^2}{n_1 + n_2 - 2}}$$

Inference on difference in two means $\mu_1 - \mu_2$ (independent populations)

Case of σ_1^2 and σ_2^2 unknown and small samples n_1 & n_2

$\sigma_1^2 = \sigma_2^2$

$H_0: \mu_1 = \mu_2$ (d_0 = _____)

Test statistic $$T = \frac{(\bar{X}_1 - \bar{X}_2) - d_0}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

X_1 ~ _____ and X_2 ~ _____

Use pooled estimate of variance _____

_____ $v = n_1 + n_2 - 2$

Inference on difference in two means $\mu_1 - \mu_2$ (independent populations)

Case of σ_1^2 and σ_2^2 unknown and small samples n_1 & n_2

$\sigma_1^2 \neq \sigma_2^2$

Cannot use _____

$H_0: \mu_1 = \mu_2$ (d_0 = _____)

Test statistic $T = \dfrac{(\bar{X}_1 - \bar{X}_2) - d_0}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$

Round down to largest _____ if has a decimal component.

X_1 ~ _____ and X_2 ~ _____

_____ $v = \dfrac{\left(s_1^2/n_1 + s_2^2/n_2\right)^2}{[(s_1^2/n_1)^2/(n_1-1)] + [(s_2^2/n_2)^2/(n_2-1)]}$

Inference on difference in two means $\mu_1 - \mu_2$

Relationship to Confidence Interval

$H_0: \mu_1 = \mu_2$ $\quad d_0 =$ _____

(,) _____

(,) _____

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