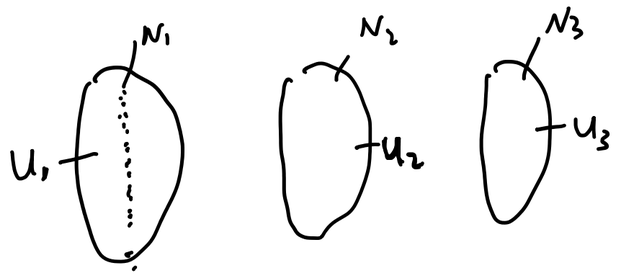
Day 12

Thursday, January 4, 2024 8:02 AM

the ANOVA Test: Analysis of Variance



H_0: $u_1 = u_2 = u_3$

H_1: at least one u is different

Treatments Control

H_0: $u_1 = u_2$

H_1: $u_1 \neq u_2$

$\alpha = 5\%$

H_0: $u_1 = u_3$

H_1: $u_1 \neq u_3$

$\alpha = 5\%$

H_0: $u_2 = u_3$

H_1: $u_2 \neq u_3$

$\alpha = 5\%$

$Pr(\text{Type I}) = 5\%$

$P(\text{Right 1} \cap \text{Right 2} \cap \text{Right 3})$

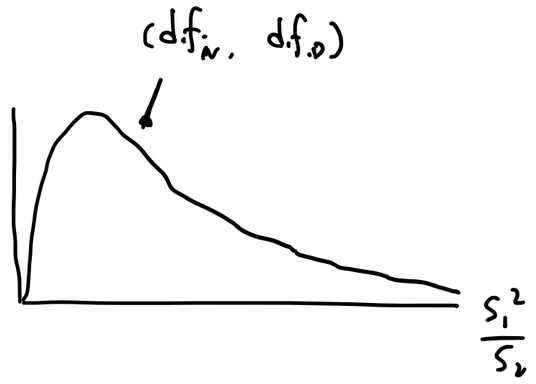
$= 95\% \cdot 95\% \cdot 95\%$

$= 0.86$

$1 - 0.86 = \underline{0.14}$

- Populations ~ Normal
- variances are the same

$F_i = \frac{S_1^2}{S_2^2}$



y_i
1
2
3
4
.

$\frac{(1-2.5)^2 + (2-2.5)^2 + (3-2.5)^2 + (4-2.5)^2}{4-1} = S_y^2$

S_1^2: variance

Sum of squares = variation in y

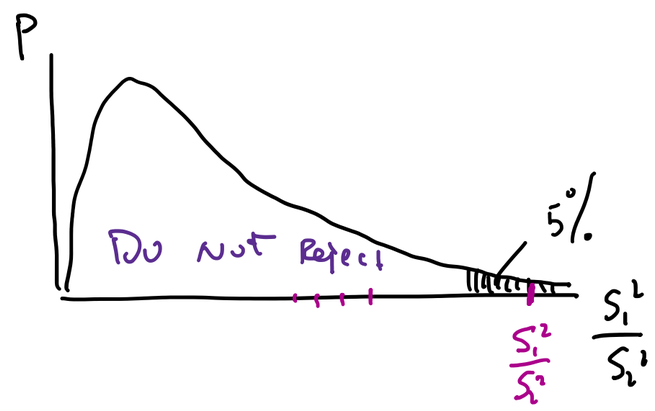
ex: S^2: variance $= \frac{\sum (y_i - \bar{y})^2}{d.f.} = \frac{SS}{d.f.}$

y_i
54

Sources of variation in y

- TrT $\Rightarrow$ (variation in y, explained by TrT)$/d.f_N = S_1^2$: variance of y $\Leftarrow$ TrT
- random factors $\Rightarrow$ (variation in y, explained by random factors)$/d.f._D = S_2^2$ = variance of y $\Leftarrow$ error

$F_{computed} = \frac{S_1^2}{S_2^2} \geq F_{critical}$: Reject



$x \Rightarrow y$

Intercept

$y_i = f(x_i) = b_0 + b_1 x_i$