

ANOVA

①

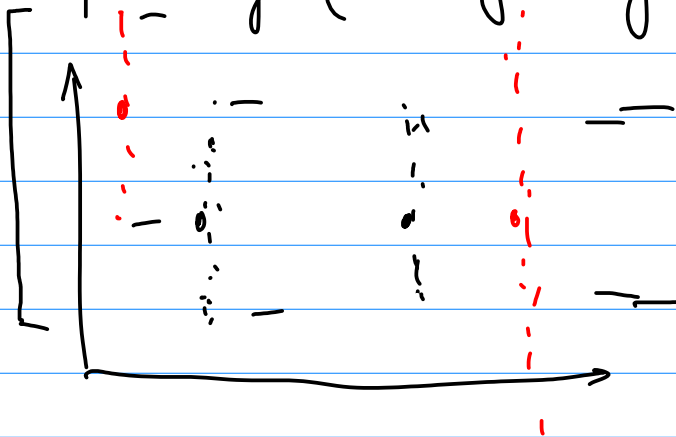
ANOVA

$$H_0: \mu_1 = \dots = \mu_k$$

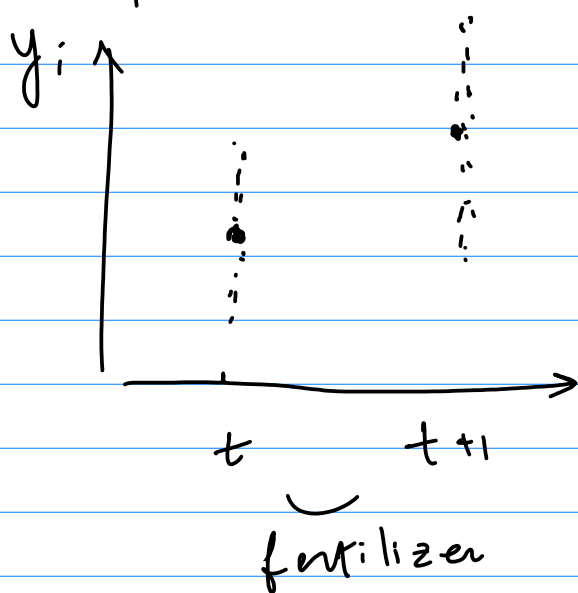
H_a : at least one differs

Assumptions:

- 1) Observations are iid.
- 2) Residuals are normally distributed
- 3) Spenicity (homogeneity of variances)



2) Repeated measures ANOVA



Assumptions:

- 1) y_i - continuous, iid, SRS from population
- 2) y_i normally distributed, no outliers
- 3) Sphericity

$$H_0: \mu_1 = \dots = \mu_k$$

H_a : at least one is different

$$y_{ij} = \mu + \alpha_i + b_j(t_i) + \epsilon_{ij}$$

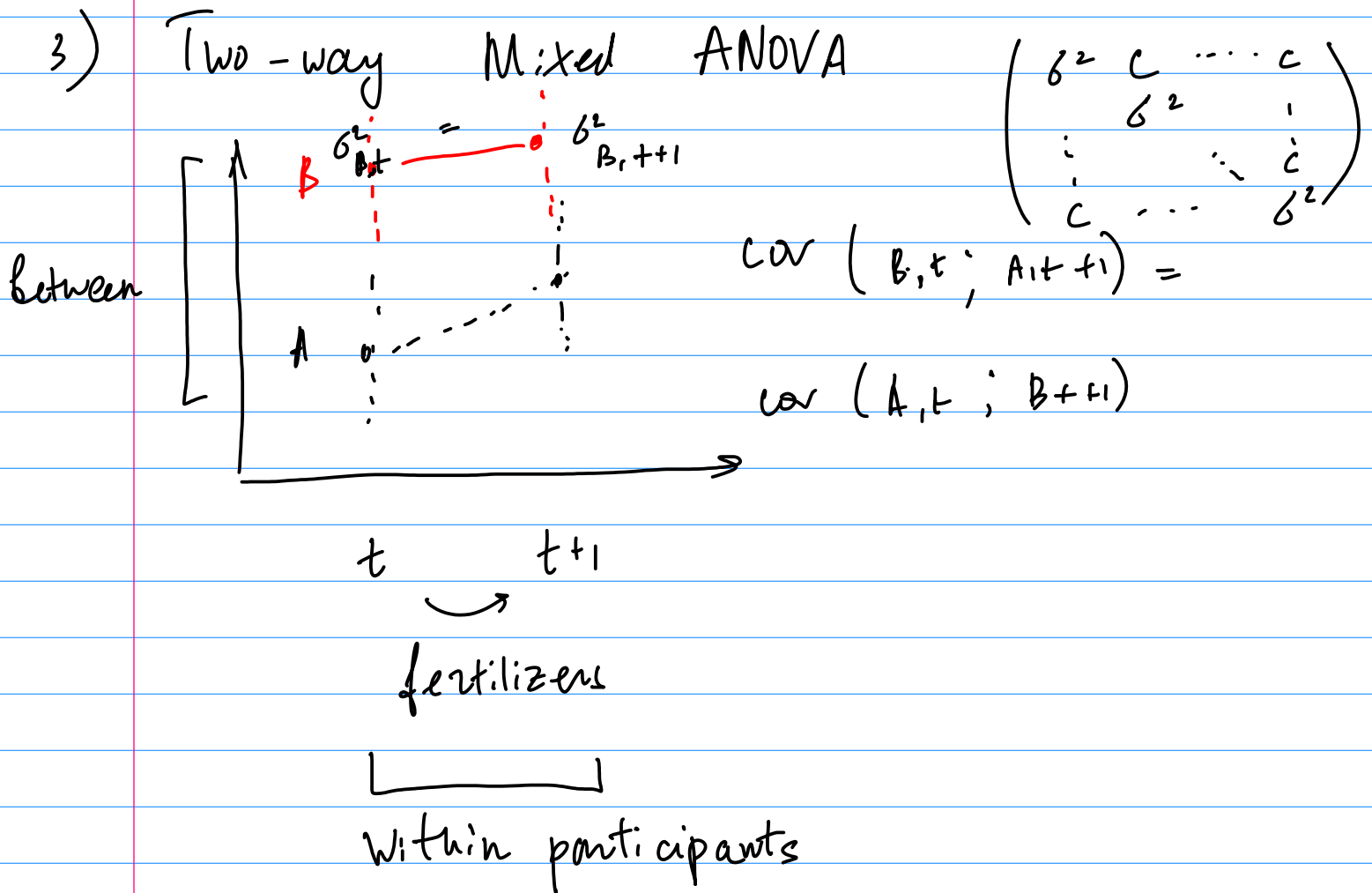
$j = 1, \dots, J$ - individuals

$t_i = 1, \dots, k$ - time points

$b_j(t_i)$ - individual effect
for j at time t_i

$$\varepsilon_{ij} \sim N(0, \sigma^2)$$

3) Two-way Mixed ANOVA



Assumptions:

1) y_i - cont, iid

2) y_i - normally distributed for
each combination between-subject
and within subject

3) Sphericity

4) Homogeneity of covariance matrix
ANCOVA (Analysis of Covariance)

$$y_{ij} = \mu + \alpha_j + \beta z_{ij} + \epsilon_{ij}$$

μ - grand mean

α_j - group j effect

z_{ij} - covariate

Assumptions:

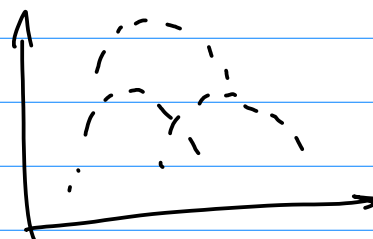
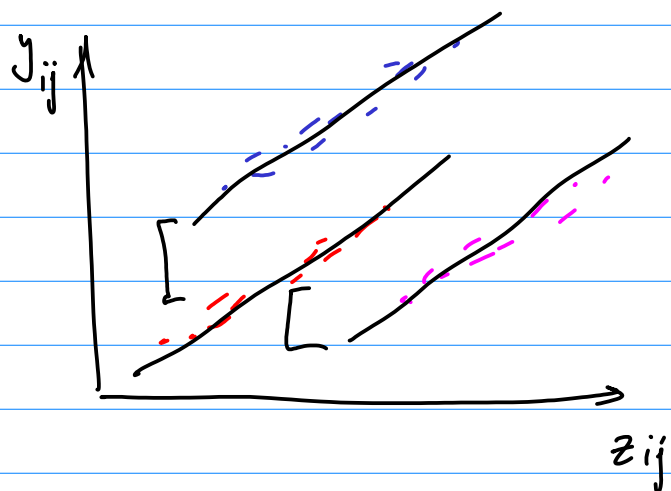
1) y_i - iid, continuous, normality

2) Sphericity

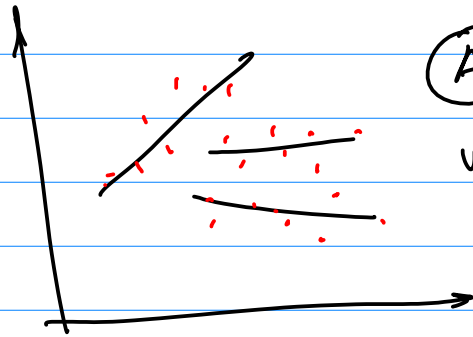
3) Linearity

(A1) $y | z$
is linear

(A2) $y_j | z$
is linear
within each
group



(A3) homogeneity of regression slopes



(A3) is violated