DoE take home assignment 1 (lecture 2)

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Question 1: Show the step to derive the following equality:

$$SST = \sum_{ij}(y_{ij} - \bar{y}_{..})^2$$
$$= \sum_{ij}(y_{ij})^2 - ar\bar{y}_{..}^2$$

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Question 2: Show that the cross product terms of SSY go to zero.

$$(y_{ij})^2 = \mu^2 + \alpha_j^2 + e_{ij}^2 + 2(\alpha_j\mu + \alpha_j e_{ij} + e_{ij}\mu)$$

Question 3: Show the derivation of the variance of the estimates $y_{..}$ and α_j.