Solutions from Mixed Model Equations

$R = I \cdot \sigma_e^2$; G

$$\begin{bmatrix} X^TX & X^TZ \\ Z^TX & Z^TZ + G^{-1} \end{bmatrix} \begin{bmatrix} \hat{\beta} \\ \hat{u} \end{bmatrix} = \begin{bmatrix} X^Ty \\ Z^Ty \end{bmatrix}$$

$$G_{6\times6} = var(\underline{u}) = \begin{bmatrix} var(u_1) & cov(u_1,u_2) & \cdots & cov(u_1,u_6) \\ cov(u_2,u_1) & var(u_2) & \cdots & cov(u_2,u_6) \\ \vdots & & \ddots & \\ & & & var(u_6) \end{bmatrix}$$

- Source of $var(u_i)$ and $cov(u_i, u_j)$ is based on the so-called "<u>large-sampling</u>" concept

Universe 1	Universe 2	Universe 3 ...
Population	Population	
1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
$\boxed{u_1}, u_2, u_3, u_4 \ldots$	$\boxed{u_1}, u_2, \ldots u_6$	$\boxed{u_1}, u_2 \ldots u_6$

$E(u_1) = 0$; $var(u_1)$

→ u_i are random variable with given expectation and variance