BVM: $y = X\beta + Zg + e = y = 1\mu + Zg + e$

Intercept

$$y = \begin{bmatrix} 156 \\ \vdots \end{bmatrix}; \quad \beta = [\mu]; \quad g = \begin{bmatrix} g_1 \\ g_2 \\ \vdots \\ g_{10} \end{bmatrix}, \quad e = \begin{bmatrix} e_1 \\ \vdots \\ e_{10} \end{bmatrix}$$

$$X = \begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix}, \quad Z = \begin{bmatrix} 1 & 0 & \\ 0 & 1 & \\ & & \ddots \end{bmatrix}$$

Expected values: $E[g] = 0$, $E[e] = 0$, $E[y] = X\beta$

Var-cov mat: $var(g) = G \cdot \sigma_g^2$, $var(e) = R = I \cdot \sigma_e^2$

$var(y) = ZGZ' + R$

Solving for $\hat{\beta}$ and $\hat{g}$ using MME

genomic breeding values

$var(y) = var(X\beta + Zg + e) = var(X\beta) + var(Zg) + var(e)$

$+ 2Cov(X\beta, Zg)$
$+ 2Cov(X\beta, e)$
$+ 2Cov(Zg, e)$ } $= 0$

const. ←

$= var(Zg) + var(e)$