PROBLEM 6

$$Y_i = \mu + \alpha_i + b_1 f_{1i} + b_2 f_{2i} + \cdots + b_L f_{Li}$$

μ = MEAN

α_i = FEMALE EFFECT

b_j = FACTOR EFFECTS $j = 1, \ldots, L$

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_i \\ Y_{i+1} \\ \vdots \\ Y_n \end{pmatrix}$$

ORDER FEMALES ON TOP

MALES ON BOTTOM

$$X = \begin{pmatrix} 1 & 1 & f_{11} & f_{12} & \cdots & f_{1L} \\ 1 & 1 & & & & \\ \vdots & \vdots & & & & \\ 1 & 1 & f_{i1} & f_{i2} & & f_{iL} \\ 1 & 0 & f_{i+1,1} & & & f_{i+1,L} \\ 1 & 0 & & & & \\ \vdots & \vdots & & & & \\ 1 & 0 & f_{n1} & & & f_{nL} \end{pmatrix}$$

$(i+1, n)$ MALES

$$B = \begin{pmatrix} \mu \\ \alpha_F \\ b_1 \\ b_2 \\ \vdots \\ b_L \end{pmatrix} \qquad \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

THIS MAKES IT FULL RANK