

LINEAR MODELS AND DECISIONS

1) SOLVE FOR  $X$  IN  $A'BX C'D = Y$  ASSUMING  $A, B, C, D$  SQUARE AND NONSINGULAR

2) SOLVE FOR  $X$  IN  $A'BX C'D = Y$  ASSUMING  $A, B, C, D$   $M \times N$  AND OF FULL RANK

NO

FOR  $W = X(X'X)^{-1}X'$  WITH  $X$   $M \times N$  AND OF FULL RANK, FIND:

3)  $WW$

4)  $(I-W)W$

5)  $(I-W)(I-W)$

WITH  $W$  AS ABOVE AND  $W^* = X^*(X^{*'}X^*)^{-1}X^{*}$  WHERE  $X^* = XM$ ,  $M$  SQUARE AND NONSINGULAR

6) SHOW  $W = W^*$

FOR  $A$  OF RANK  $R$ , LET  $A = FR'$  WITH  $F, R$  OF  $R$  LINEARLY INDEPENDENT COLUMNS

DEFINE  $A^{\mp} = R(R'R)^{-1}(F'F)^{-1}F'$

7) FIND  $AA^{\mp}A$

8) FIND  $A^{\mp}AA^{\mp}$

9) SHOW  $X = A^{\mp}Y$  SATISFIES  $A'AX = A'Y$

10) LET  $X = A^{\mp}Y$ ,  $\hat{Y} = AX$ , AND  $\hat{E} = (Y - \hat{Y})$ , FIND  $\hat{E}'\hat{Y}$