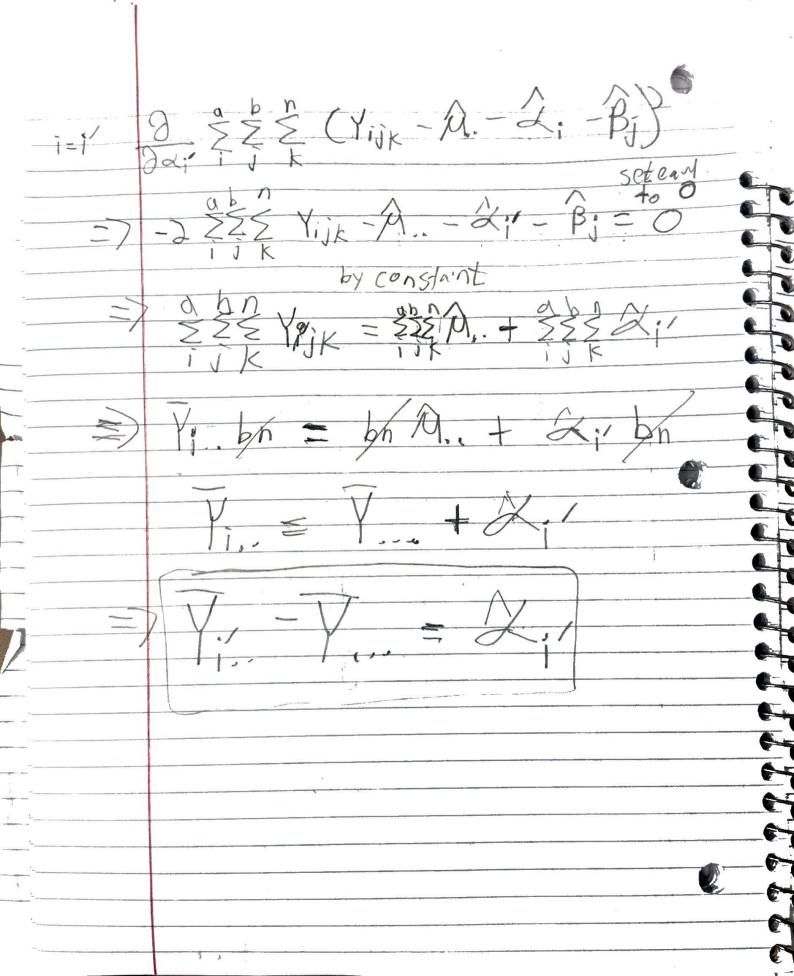
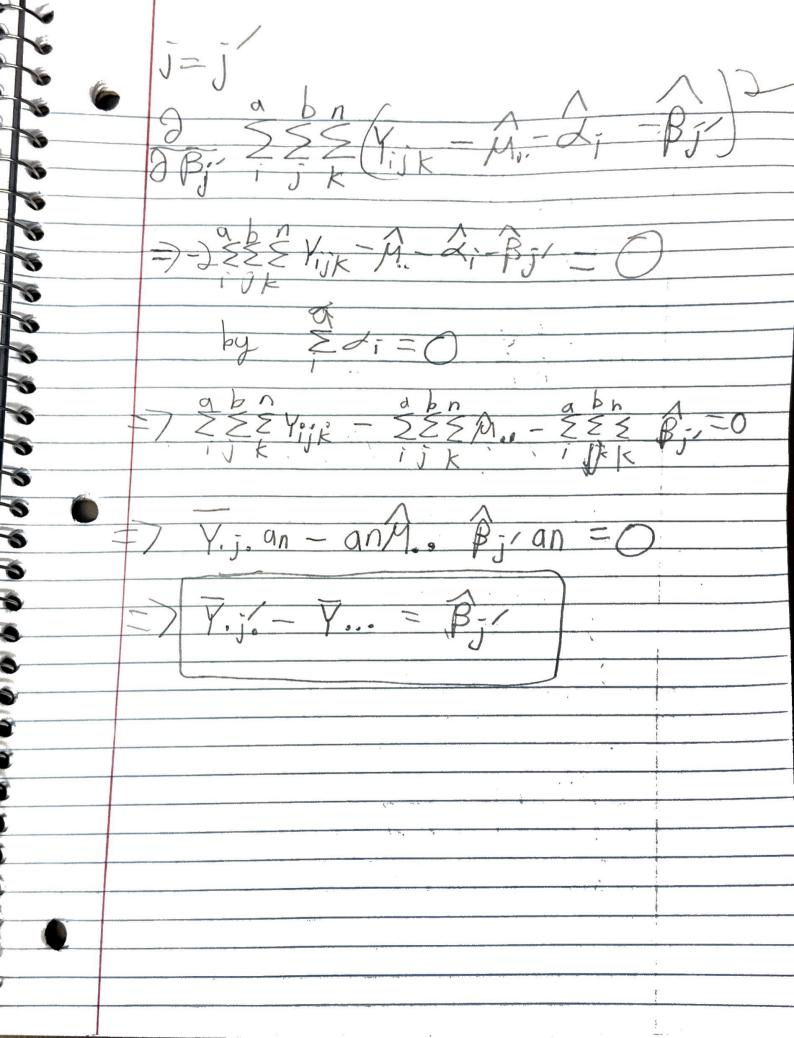
model with fixed effects Yill = M+ d; +B; +Eijk 1=1,-,a, j=1,-,bx k=1,-,h where Edi3 satisfies that Edi=1 EB-3 satisfus D+ ZB=0, and Elists are ild NO52) Derive The lest squas estimatis forthe above model USE Critician function Criteon Protrini E E E (Yijk - M - 2, - B) Set of S 2 (critical function) = 25 2 2 (Yik - Ph - 2; - B) (-= / ZZZ Vijk = ZZZ M. = A. => | A.. = 525 Yilk =





8) Consider the following models Yirik = Mi- + Eijik K=1,-1n, i=1,-10, j=1,...,h Yijk = E E BI, m XI, mji sijk + Eijjk k= /, n,i=1, , a, j=1, , b where EEining are i'd NCO, org  $Cl_{j,m}$ )=(i,j) and XIMijijik = O otherwise. E xpress EB1,m: 1=1,-163 Using EMini [=1,...,0; [=1,...,b] Mij + Erlik = EE Byn Ximiisik teijsik Mij = Bij Mij = B1,m

SSE = Zei SSR = Z(Y-Y) BOLS = (XTX) - XTY. We thin hee Y = X(X/X) XTY = P.Y and e= Y- Y = Y- XB = (I-Px)Y Thoufus, le courte down le two sons of squas as SSE = e e = Y (I-P,)Y SSR = YT(Px-P) in Jn where while P, = 1(1T) | T = 11/AT , 1= (1-1) Px, P, I-Px, Px-P, are orthogon 1 pyets Properts of orthogonal projectors PXT = PX, PX PX = PX X - design matrix

Projection matrix maps a vector of response viriables to a vector of fitted variable what properties right unde? ry to prove (or (I-Px)Y, (Px-Px)Y)=C We will need PxP = P, whi we use
the fact that the first color of Jesus
matrix X is (P) (X) Prove: PxP = P. Note: Px projects onto (olx) orthogonally spun of coknops of x Projects onto span E(1, -, 1) 3 C (O/(X) 50 PxP = P. . [] Also, (I-Px)(Px-P) = (I-Px)Px - (I-Px)P,  $= (P_{x} - P_{x}) - (P_{y} - P_{x}P_{y}) = 0$ So (ov (I-Px)Y, (R-P)Y)=(I-Px)(Px-Px)(ov(Y,Y)=0 & under normlity assumption this mens they are O.D.