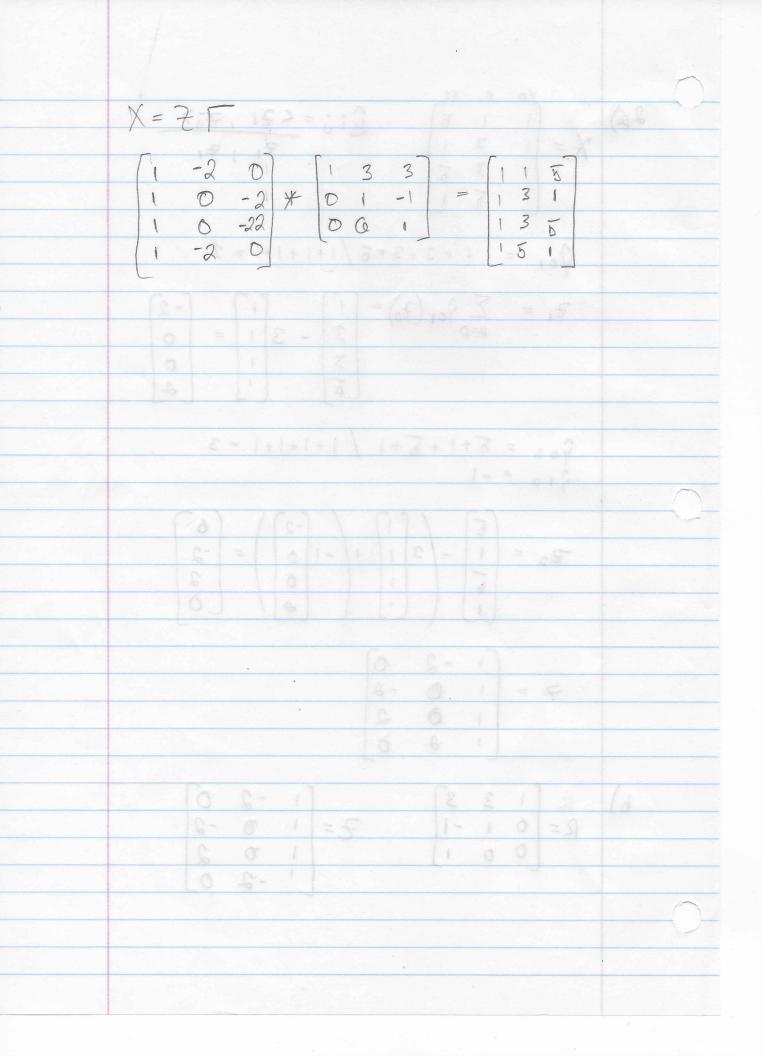
Gauss-Markov Theram Proct Vor(d'y) > Vor(c'B) Var (din) = Var(din - e'B+c'B) = Var(d'y - c'\(\beta\) + Var(\(\cepa\)) + 2(\(\cepa\)(\(\d'y - \c'\beta\), (\(\beta\)) Var(d'y-c'p3) = Var(d'y-l'y) = Var((d'-l')4) = Var((d-1)'y) =(d-l) Var(w)(d-l) = (d-D'(02I)(d-1) =02(d-l)'I(d-l) = 02(d-l)(d-l)>0 by(i) Cov(d'y-d'B, d'B) = Cov(d'y-ly, l'y) = (ov((d-l)'y, l'y) = (d-l)' Vor(y) l  $= o^{2}(d-l)' l$   $= o^{2}(d-l)' X(x'x) = 0 b_{y}(2)$ Var(d'y) = Var(d'y-c'B) + Var(c'B) Vas(d'y) > Var(c'B) -QED taken from: public, jastate. edu



 $RSS(\lambda) = (Y - XB)^{T}(Y - XB) + \lambda B^{T}B$  $= (Y^{T} - \beta^{T} X^{T})(Y - X\beta) + \lambda \beta^{T} \beta$   $= Y^{T}Y - Y^{T}X\beta - \beta^{T}X^{T}Y + \beta^{T}X^{T}X\beta + \lambda \beta^{T}\beta$   $= \partial(Y^{T}Y - \partial(\beta^{T}X^{T}Y) + \beta^{T}X^{T}X\beta^{T} + \lambda \beta^{T}\beta)$  $= -2(x^{T}y) + (2x^{T}x\beta) + 2\lambda\beta$  $-2(x^{T}y)=(2x^{T}xB)+2\lambda B$  $-2(x^{T}y)=2\beta(x^{T}x^{T}+2x^{T})$ · XTY = B(XTX + XI) · (XTX+XI) XTY = B B(Proles) = (XTX+)I)-XTY XBrose = X(XTX + XI) - XTY = UD(D2+XI) DUTY where U is a NXP arthogonal matrix with column Il spanning the column space of X D 75 a PXP dragonal matrix, with dragonal entries d, 2dg 2... 2dp 20 XBroloe = E us de ujy where He columns are the columns of U. Smee 120. (23+2) - coordinates if y with respect to the orthonormal boosis is The coordinates shrink by the factors of. A greater Shrahage are applied (23+1) to the smaller of?