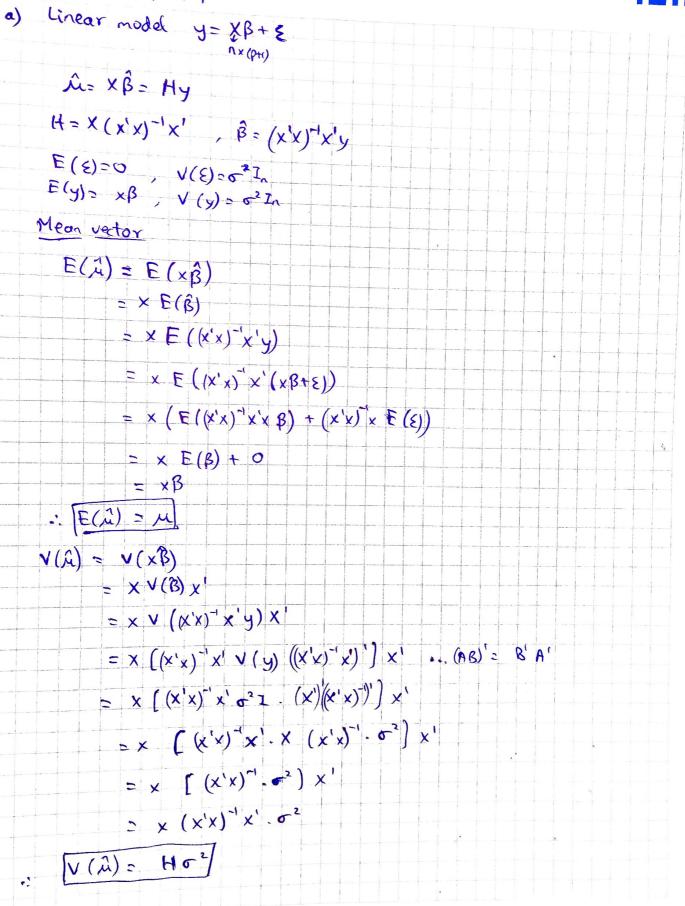
Applied Regression

Problem H.4





b)
$$Var(A) = \sigma^2 h$$
 $\frac{1}{h} \stackrel{?}{=} Vas(Ai) = \frac{\sigma^2}{h} \stackrel{?}{=} hii$

The trace of square matrix is equal to sum of its diagonal elements As : to $(As) = tx (BA)$

Applying tens to hat matrix

 $\frac{1}{h} \stackrel{?}{=} Var(Ai) = \frac{\sigma^2}{h} tr(H)$
 $\frac{1$



$H' = \times (X'(X')')^{-1} X'$
$= \times (x'x)^{-1}x'$
: [H' = H]
Show: 0 ≤ h; 1 ≤ 1
i) hii 3,0
Let a: ER is a vector with all components equal to 0, except for its term which is I
· O; = (00 0) Null vector
Quadratic form a; lt a; = h;; > 0
lef lite = 2 cu - → O here 2 > eigen value cu → eigen vector
$H = \lambda H \omega$ $H^2 \omega = \lambda (\lambda \omega) = \lambda^2 \omega \rightarrow \varnothing$
His idempotent High the start of the start
$\lambda(\lambda - 1)\omega = 0$
oigen values are non-negative, so is His positive semidefinite and to p.s.d. has non-negative diagonal elements. [hii >, 0]
ii) hii = a 'H.a; hii = a 'H.a; Projection matrix M = I-H
N 25 Q 25 (T-H) 25 Q 25 d
as we subtract something the from 1,
As we subtract something tre from 1, hii < 1

ICH WILL