$$\frac{\partial f(x)}{\partial N_{i;}} = e_{i}^{T} A e_{i}$$

$$= a_{5;}$$

$$\frac{\partial f(x)}{\partial \chi} = f^{T}$$

$$\frac{\partial^2 f(x)}{\partial x \partial x^T} = O_{n \times n}$$

$$\frac{\partial f(x)}{\partial y_{11}} = \alpha_{11} \qquad \frac{\partial^{2} f(x)}{\partial y_{11} \partial y_{11}} = 0$$

if X h symulonic.

$$\frac{\partial f(x)}{\partial N_{11}} = a_{11}$$

$$\frac{\partial f(x)}{\partial N_{12}}$$

$$\frac{\partial f(x)}{\partial N_{ij}} = \frac{\partial}{\partial N_{ij}} \, \lambda_{D}(Ax) = \lambda_{D}(A\frac{\partial x}{\partial N_{ij}})$$

$$= \lambda_{D}(A(e_{i}e_{j}^{T} + e_{j}e_{i}^{T}))$$

$$= \lambda_{D}(A(e_{i}e_{j}^{T} + A(e_{j}e_{i}^{T}))$$

$$= \lambda_{D}(e_{j}^{T}Ae_{i}) + \lambda_{D}(e_{i}^{T}Ae_{j})$$

$$= \lambda_{D}(e_{j}^{T}Ae_{i}) + \lambda_{D}(e_{i}^{T}Ae_{j})$$

$$\frac{\partial f(\vec{n})}{\partial n_{ii}} = \frac{\partial f(\vec{n})}{\partial n_{i$$

$$\chi = \left(\begin{array}{c} \left(\widehat{\mathbf{w}}_{ij} \right), \\ \left(\widehat{\mathbf{w}}_{ij} \right) \end{array} \right)$$

· X in a samue materin and X' counts

$$=) \frac{\partial}{\partial N_{ij}} \left(\chi \chi^{-1} \right) = \frac{\partial}{\partial N_{ij}} \left(\underline{T}_{n} \right) = 0$$

$$= \frac{\partial x^{-1}}{\partial x_{is}} = \frac{\partial x}{\partial x_{is}} x^{-1}$$

$$\frac{\partial \chi^{-1}}{\partial \chi_{ii}} > - \chi^{-1} \frac{\partial \chi}{\partial \chi_{ii}} \chi^{-1}$$

iP X is symmetric,

$$\frac{\partial x^{-1}}{\partial x^{-1}} = -x^{-1} \left(e_i e_i^T + e_i e_i^T \right) x^{-1} | f_i | = 1$$

$$z - \chi^{-1} \left(e_i e_i^{T} \right) \chi^{-1}$$
 if i=3

Linear Estimation.

· Y_{1,---} ___, Y_n ~ N (0,1) and Y_{1,-} _. Y_n are independent.

$$\overline{Y} = \frac{1}{n} \underline{Y}_{i}$$
, \underline{Y}_{i} for some i , $\underline{Y}_{i} + \underline{Y}_{i}$

$$\underline{F}(\underline{Y}_{i}) = 0 \quad \forall i = I(i) n$$

and
$$Van(Y_i) = | \forall i$$

$$E(Y_i)$$

$$E(Y_i)$$

$$Y_i \neq j$$

$$Y_i \neq j$$

$$Y_i \neq j$$

$$Y_i \neq j$$

$$E(Y_{n_1})$$

$$E(Y_{n_1+1})$$

$$E(Y_{n_2+1})$$

$$E(Y_{n_2})$$

$$= (Y_{n_2})$$

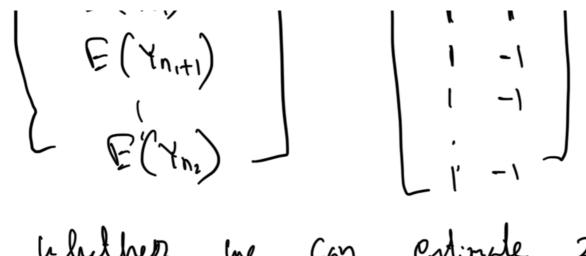
$$= (Y_{n_2})$$

$$= (Y_{n_2})$$

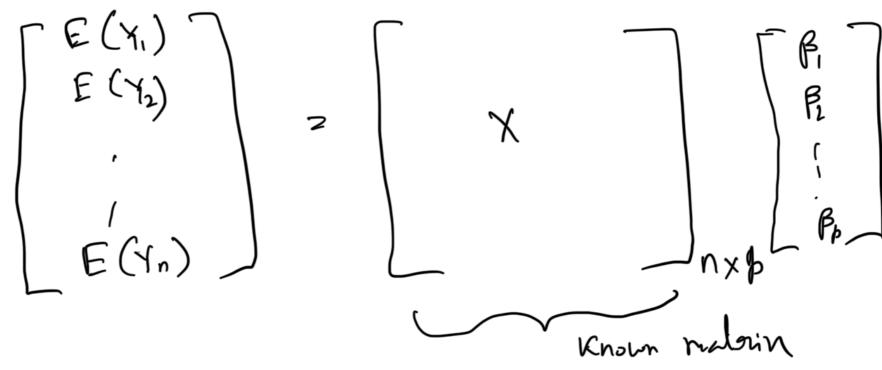
$$= (Y_{n_2})$$

$$= (Y_{n_2})$$

$$E(X_{n})$$



whether we can estimate $2\theta_1 + \theta_2$?
Whether we can estimate θ_1 and θ_2 ?



The arrestion is whether he can estimate.

P1,..., Pp or any function of P1,-- Pp.

Let y,,__, yn be such that

E(Y) = XB where Xnxp 11 a known materia and B is a set of un known barameters. Furthere Van (Yi) = σ^2 + i=10p (unknown) and σ (Yi, Yi) = σ \tag{1} \ta

Dur observines are

(i) Finding estimators of B1,...: Pp and their linear function

(i) finden on ortination of 12.

This model is similar to the following model Y = YP + E where $E = (E_1, ..., E_n)$ are grand on Variables with $E(E_i) = 0 \, \forall i$, $Var(E_i) = \sigma^2 \, \forall i$, and $G_{i}V(E_i, E_i) = 0$.

And X 11 a Know materin and B 11 vector of un Knows.

· A linear function of B. LTB, is estimable if

I a linear function of y, CTY, 1.1

E(CTY) = LTB + BERA

· Enamble
$$Y = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$
 $X = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $\begin{bmatrix} P_1 \\ P_2 \end{bmatrix}$

$$y_1 + y_2 = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix}$$