OPTIMIZATION FORM 4 (3) x e R dx4n minimize  $\| \mathbf{X} - \phi \phi^{\mathsf{T}} \mathbf{X} \|_{\mathsf{F}}^2$ O & Raxa Grobenius norm st. Φ<sup>T</sup> Φ\* = I here X is the matrix from the optimization problem \$ is the matrix consisting of columns of eigenvectors the objective for can be simplified as:  $\| x - \phi \phi^T x \|_F^2 = tr(x^T x - X X^T \phi \phi^T)$ trace of matrix its lagrangian is (f(x) - 2 g(x))  $\mathcal{L} = tr(X^{T}X) - tr(X^{T}X^{T}\varphi\varphi^{T})$   $- tr(\Lambda^{T}(\varphi^{T}\varphi - I))$ -> eigenvalue matrix Rolxd. equating derivative of L to 0 gives: 30 = 2xx 0 - 20 A = 0  $\Rightarrow \chi \chi^{\dagger} \phi = \phi \Lambda \Rightarrow A \phi = \phi \Lambda$ > eigenvalue problem in vector form this can be useful in machine

learning, when we wante to

consider several PCA directions of dimensionality reduction

(B) FISHER DISCRIMINANT PUMLYSIS (B)

this is a dimensionality reduction technique which attempts to classify a set of points in reduced dimensions. it tries to keep the mean of both classes as separate as possible, while trying to minimize variance within a class.

w. zwiechon surbace

w = projection surbace

Se = \frac{\fracc}\frac{\frac}\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fracc}\frac{\frac{\frac}}}}}{\frac{\frac{\fr

this objective can be restated as:

wastan

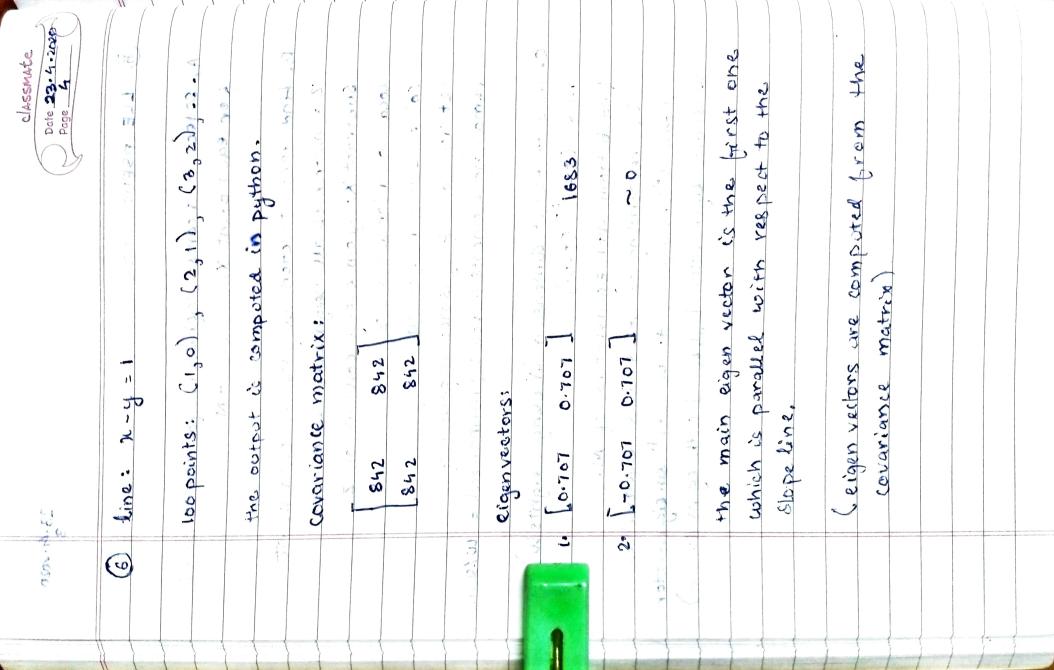
 $\frac{1}{(3M-\frac{5}{15})} \left(\frac{1}{15} - \frac{1}{15} \left(\frac{1}{15} - \frac{1}{15}\right) \left(\frac{1}{15} - \frac{5}{15}\right) = 0.2$ 

1 = m ms\_m .75

finding its lagrangian, and equating its

Sow = 75 cm of the polarish moltiple

problem form, we can now one of the solution methods to obtain we form, Corojution plans).



Sale p. CC stad	0			
classmate				

1		2.31 (1.+) (8)
	 1.626.1	notasidatini (A) (F)

(2) : 4.2 : 16.5

30 Error an decrease burther, agree. (A) if we increase K ? we allow more classed

then objective (error) would be O. (B) the max value of 14 can be N (no. of pants).

too, (but objective\* & might not change). (c) normalized objective (error) would decrease

