	1	2019111019								
1	4	Statistical Methods in Al								
<u>al</u>	a)	Singular value decomposition is more generalizable.								
		SVD can be applied to any matrix of shape mxn (m,ne								
		However to apply Eigen value decomposition on a matrix X,								
		x must be diagonizable. That is, x should be a square								
,	12 1.1	matrix, and there exist an investible matrix of								
		dimensions same as x, such that Y. X. Y-1 is a								
1	3	diagonal matrix.								
. And	6)	let M = [4 8] 11 7 14 -2								
2 · /-		[14 -2]								
	-									
-		We want to find SVD for M.								
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		⇒ M = UZVT								
		where vut = vvt = I = vtv = utu								
		and I is a diagonal matrix with non-negative entries.								
Willia.		We know MTM = VITEVT since UTU=I								
		÷								
		$\Rightarrow M'M \cdot V = V \cdot 2 \cdot 2$ $\Rightarrow M'M \cdot V \cdot V = V \cdot \nabla \cdot 2$								
		Column vector of V								
		Vi is eigenvector of MTM.								
	1	MTM = 4 11 14 4 8 = 333 81								
:		87-2 117 81 117								
y 4.	- J.	14 -2								
	they make									
	The state of the s									

To find eigen vector and eigen value -

det (MTM - λI) = 0

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det	333-7	81	= 0
	81	117-7	

- $(333-1)(117-1)-81^2=0$
- $\chi^2 450\chi + 32400 = 0$
- $(\chi 90)(\chi 360) = 0$

So the eigenvalues are 90 and 360.

To find eigenvectors, we compute vectors in nullspace

MTM-90I =	243 81	V=	-1/10	
	81 27		3/10	

MTM - 360 I =	-27	81	V=	3/10	
		-243	44	1/10	

So we eigen values 360 and 90.

Using this we get Z as:

٤ =	N360	0		6110	0	1
	0	N90	is the	0	3/10	
	. 0	0	4	0	0	

We form V using eigenvectors corresponding to these eigen values.

V=	3/10	-1/10
	1/10	3/110

	D
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To	find	U.	we	USP	MV=	UI

using this:

Us = eigenvector for MMT for eigenvalue O.

det (MMT- λI) = 0

1	80-X	100	40	= 0
	160	170-2	140	
	40	140	200-7	1

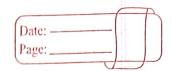
Needed vector is nullspace of:

MMT-	80	100	40	V=	2137
	100	170	140		-213
	10	140	200		1/3

$$U = \begin{bmatrix} 1/3 & 2/3 & 2/3 \\ 2/3 & 1/3 & -2/3 \\ 2/3 & -2/3 & 1/3 \end{bmatrix}$$

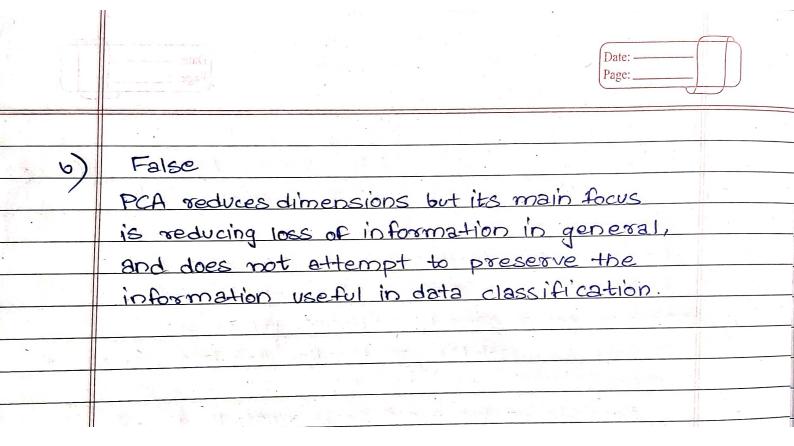
So, M= UIVT is equal to:

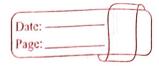
-					1			4-1	Section 1			37	-
	4	1	8		1/3	2/3	213		GNTO	0	3/10	-1/15	1
	11	b	7	A	2/3	1/3	-2/3		0	3/10	1	7410	
	14)	2	1 .	213	-2/3	1/3		0	0	100	3/10	\ \ \
								-					



02 a) correct options = BC Explanation -

- A Diagonal elements of Dare equal means all eigen values are equal. Hence the data would be equally spread in all eigen vector directions and PCA will not be useful.
- B- If all elements of D are not equal, that means there exist unequal eigenvalues. Hence PCA will select eigenvectors based on rank of eigen values. So PCA will be useful.
- c while doing PCA, the line itself will become the principal eigen vector. Spread along rest, eigen vectors will be o. So o eigenvalue perpendicular will lead to dete D not being full rank.
- D Vis always full rank.
- F This is isn't correct as we can take a set of points, do mean shifting and show that mon-zero eigenvalues can be found. So D can be full rank.





03 8)	Prior probability is the probability of an event occurring
	before any data is collected or some evidence is
	taken in account. Posterior probability is the updated
	probability after taking into consideration the
	new information.
	a group of people
	eg Lets say probability of person having
	could is P. This is our prior probability.
	If we learn that the group of people have
	recieved both doges of their vaccines, then
	the probability of them having covid
1	won't be P anymore but will get updated
	because of the new evidence. This updated
	probability (P(covID 2DOSES)) is the
	posterior probability.
e in the	The state of the s
6)	P(Headachelsore throat) = 0.2
	P(Flu) = 0.5
	P (Headachelsore throat Flu) = 0.9
	P(Flu Headacheksore throat)
	= P (Headaachedsore throat FW), P (FIU)
	P(Headache sore throat)
	$= 0.9 \times 0.5$
	0.2
V	= 0.225