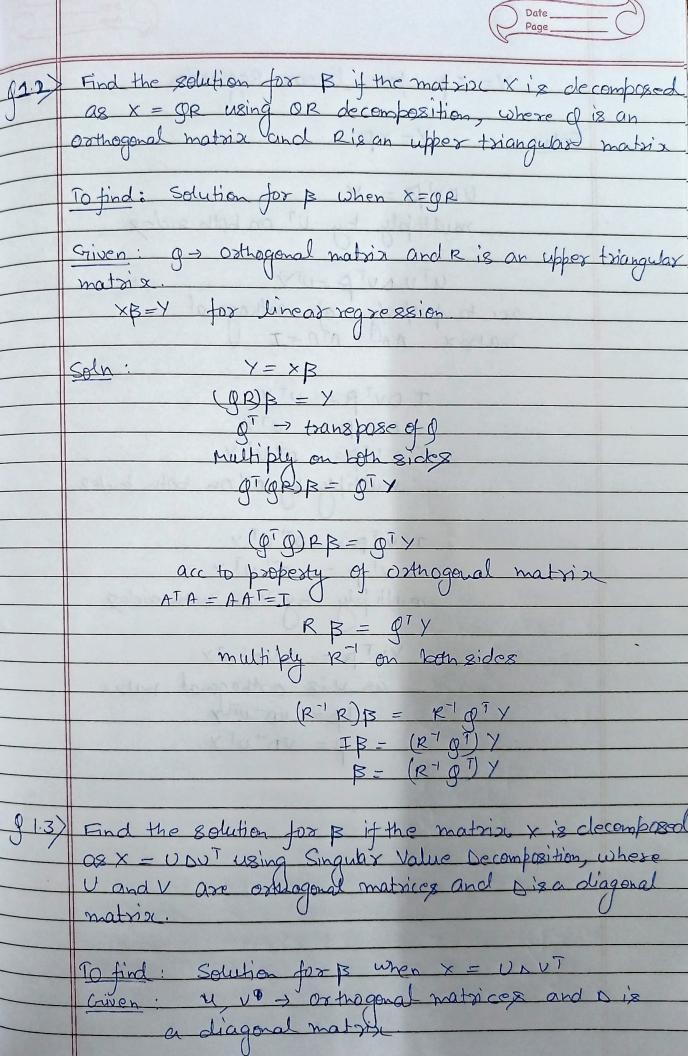
	Linear Algebra Assignment - 6
011->	Prove that xix is invertible if and only if the columns of x are linear independent.
J	of x are linear independent.
	(Forward implication)
	To prove: columns of x are linear independent
	Given: XT x is invertible
	Proof: let's solve for below egh
	X y = 0 where y continuous
	X u = 0 where u coefficient matrix
	multiply xT on both sides
	$x^{T}(x_{u}) = x^{T}(x_{u})$
	$(x^{T}x)u=0$
	but as xix is investible
	=> (x7x) u has only 180/n which is
1	txivial soln
	=> X u = 0 is to has soln when
	u=0
	Vet (, (2) (n be columns of X
Also a	and a, a, and be coefficients of a
	The state of the s
	9 (1 + 92 (2 + 93 (3 + an (n = 0
	Only when $q = a_2 = a_3 = - \cdot \cdot \cdot q_n = 0$
	dinan
	80 acc to definition of independent,
	we can henceforth say that, columns
	of x are linear independent.
	Hence proved
_	(Back ward implication)
	To prove: XTX is invertible
_	Given: Columns of X are leinear independent
_	Popol:
_	

XIX V=0 let's sodue for this multiply by VI on both sid os vixi xv=0 (Xy) T (xv) =0 => (xv)=0 -> X(v)=0, v lies in null space of x Columnsof but x is findependent linear => zero vector is only vector in nullspace of x => X [X V=0 has only , 28 h that is which is trivial sola and vice-versa xix is invertible honce provol



	y=xx for linear Regression
	Soln: Y= X}
_	unib v
	$UDV^{\dagger}\beta = Y$
_	multiply by UT on both sides
	uTU DUT B = UTY
	acc to proposty of oxthogonal
	matrix AAC = ATA = I
	STATE STATE OF THE
	I DUTB = UTY
	DVI B = UTY
	D'DVIB= D'UIY
	multiply by 0" on both xides
	I V B = D UTY
	VTB - D-VTY
	multiply by von both sides
	VVTB = VD'UTY
in the	as vis ottagonal matrix
	IB = ND-1 DILY
	$B = VD^{-1}U^{T}Y$
	Y de la
The state of	