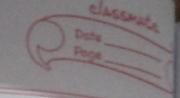


matrix is now equivalent to Hence every sow-beduced materia on - Red- on

of Every man matora is now equivalent to row-reduced echelon matrix · We aboady proved that every matrin is sow equivalent to row-reduced matrix we can easily say that it will also be tow equivalent to row-reduced exhelon matrix since by doing or w swap , we can ensure that the about reduced matrix is now-reduced echelon matrix

4	I Amon & men then proill always has "non-trivial sol"
	let R be the mu staked echelon matrix of A, now since R & A are
	row equivalent which implies that Ax=0. A Rx=0 have enactly
	Same Bol"
	Now let & be the non-zero nows of R
	since remen thus
	ateast preciable making the sol" non-trivial.
1200	But if m=n then there went be any free variable making the
	Sol'trivial
	1.c for the case when x=m=n R= Ionxn
-	
	001 (i)
	The state of the s
10	All Tis will become "o" making the sol" toisial

an ensure that the over

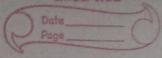


If man there maybe a case when the word reduced cohelon matrix this with the possible.

I no o ...

In o 1 --- But man Home Record be a now reduced

A contradicting



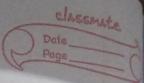
of let e be an elementary sow operation and let E be an elementary matrix Such that e(I)= E Then show that for every Amen c(a) = E. A let e be the multiplication by a constant let now and be the now multiplied with a (Ewill be man) 0 otherwise Now EA = SEir Arj = CAaj i= a

Aij i = a EATY e(A) ija (Ai) i= x
Ai) i + x \*) EA = e(A) 1 let e be row swap blow d 8 B diBEM 1 i= \( \begin{align\*}
 i = \( \beta, \) j = \( \delta \)

0 i= \( \alpha, \) j \( \delta \)

0 i= \( \beta, \) j \( \delta \)

0 i= \( \beta, \) j \( \delta \) 1 ij otherwise (EA) = Seir Ar; Ap;
Ar;
Ar; By simple manipulation i=d otherwise e(Ap); = { Apj ind Axj i=B Aij otherwise



operation is Prot ARS + Rr = Rr A=c Now ARi+ Rj > row 's' equal Atimes on 1) Eij = { Bij 1 ij i + r is 5000 1 41 (EA) ij = \( \sum\_{\text{Eix}} A\_{\text{Fi}} \) = \( \sum\_{\text{Aij}} \text{TCAsj} \) \( \text{TEX} \)

(EA) ij = \( \sum\_{\text{Eix}} A\_{\text{Fi}} \) = \( \sum\_{\text{Aij}} \text{TCAsj} \) \( \text{TEX} \)

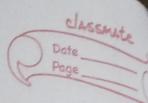
(EA) ij = \( \sum\_{\text{Eix}} A\_{\text{Fi}} \) = \( \sum\_{\text{Aij}} \text{TCAsj} \) \( \text{TEX} \) Since when jer Eik = (Irk+ C Isk) 1) E (Inx+cIsk) Akj = S IrkAkj + c SJskAkj = Arj + c Asj Also e(A) ij = CAsj+ Arj i=r Therefore (e(A) = EA HIP

Hence proved for all three operations

Show following are equiplest D) A's invertible is Axeo has only trivial sol in Ax= 4 has a soi for each 4 let R be the row reduced exhelon matrix equivalent to a Since R is now-reduced exhelon matrix of (non) this and Ris invertible thus it must be row equivalent to In because if last row is o them R= 9, ez --- A inverse and ens? and taking any natrin our row will become out

	Also we already know Anen is sow agus. to Inxa them AX=0 has only trivial sola
	thus AX=0 has only toivial sol"
i) =	then A is sometime one equ. to 2  => $A = e_1 e_2 e_K(A)$
	then A is sovertible row equ. to 1
	=) A = e <sub>1</sub> e <sub>2</sub> e <sub>K</sub> ( <u>A</u> )
	piastrotao
	Since erez erc(1) are inventible thus A is also invertible
	No. Ax=Y L O.M
	X=A-14 If A is inventible I which can be deduced from (i)
	From (i)
	i di att di AA
	Lat TI La ma avodured Propos as ATTOM 9
→(i)	let R be 8000-reduced echelon matrix of A
→ (i)	then
<b>→</b> (i)	A   AX = E   E = E = E = E = E = E = E = E = E
→(i)	A   AX = E   E = E = E = E = E = E = E = E = E
→ (i)	Now Since it must satisfy for all 15 }  Let E be one with but sow = 1
→ (i)	then  Exequivalent to y  Now since it must satisfy for all 15 \( \frac{1}{2} \)  Let \( \text{E} \) be one with but sow = 1  thus \( \text{R} \) can't be '0'.
→ (i)	then  RX = E  RX = E  New Since it must satisfy for all 5 }  let E be one with but now = 1  lest row of thus R and be 'o'  there R is a row reduced eigheld matrix with last row as
→ (i)	then  RX = E  Proquivalent to y  Now since it must satisfy for all 5 }  let E be one with but sow = 1  Lest sow of thus R early be 'o'.  There R is a sow reduced echelon matrix with last sow as  Non-zero
→ (i)	then  A   RX = E   E requivalent to i  New since it must satisfy for all 15 y  let E be one with bust sow = 1  (ent sow of the 'o' there R is a sow reduced exhelon matrix with last sow an hon-zero  thus it must be 1 mxn
→ (i)	then  A RX = E  Now since it must satisfy for all 5 }  let E be one with but now = 1  (ept now of thus R can't be 'o'  there R is a now reduced enhelon matrix with Got now as  non-zero  thus it must be Inxn  Hence A is now equivalent to Inxn
→ (i)	then  A RX=E  Exequivalent to y  New since it must satisfy for all 5 g  let E be one with but sow = 1  Gest sow of thus R can't be 'o'.  there R is a sow reduced echelon matrix with last sow as  non-zero  thus it must be Inxn  Hence A is sow equivalent to Inxn  Hence A is sow equivalent to Inxn  There A is sow equivalent to Inxn
→ (i)	then  A RX = E  Reprivate to y  New since it must satisfy for all 15 y  let E be one with but sow = 1  Lest row of the Co?  There R is a row reduced echelon matrix with last row as  non-zero  Thus it must be 1 mxn  Hence A is row equivalent to 1 nxn  Hence A is row equivalent to 1 nxn  A = ex exel(1)  Again exy cx, e, are all inventible, hence
→ (i)	A RX=E  Right must satisfy for all 6 }  Let E be one with but now = 1  Lest must be 'o'  There R is a now reduced enhelon matrix with last now as  Non-zero  Thus it must be Inxa  Hence A is now equivalent to Inxa  A = ex exel(1)  Again exy exel are all inventible, hence  A is inventible
→ (i)	then  A RX=E  Eraquivalent to y  New since it must satisfy for all 6 y  let 6 be one with bust sow = 1  lest sow of the R is a sow reduced enhelon matrix with last sow as  there R is a sow reduced enhelon matrix with last sow as  non-zero  thus it must be 1 mm  Hence A is sow comivalent to 1 mm  A = ex exe (1)  Again exy exe, are all inventible, hence  A is inventible  Als inventible
→ (i)	A RX=E  Right must satisfy for all 6 }  Let E be one with but now = 1  Lest must be 'o'  There R is a now reduced enhelon matrix with last now as  Non-zero  Thus it must be Inxa  Hence A is now equivalent to Inxa  A = ex exel(1)  Again exy exel are all inventible, hence  A is inventible

ij



If mon there maybe a case whom the a now reduced exhelon matrix this wait be possible.

holl--- But mon thence Ruson't be a now reduced

Chelon matrix

Contradicting