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## AI61003 Linear Algebra for AI & ML Assignment 01 - Problem 05

(a) Prove associativity of matrix multiplici  
Notation: If 
$$A \in \mathbb{R}^{m \times n}$$
 then  $A_{ij}$  for  
 $i = 1...m$ ,  $j = 1...n$  denotes  $(i,j)$ th  
entry in matrix  $A$ .

$$(A(BC))_{ij} = \sum_{t=1}^{n} A_{it}(BC)_{tj}$$

$$= \sum_{t=1}^{N} A_t \sum_{k=1}^{P} \left( B_t C_k \right)$$

$$= \sum_{t=1}^{n} \sum_{k=1}^{p} (A_{it} B_{tk} C_{kj})$$

· 
$$\text{lly } (AB)_{ij} = \sum_{k=1}^{N} (A_{ik} B_{ki})$$

$$((AB)C)_{ij} = \sum_{t=1}^{p} (AB)_{it} C_{it}$$

$$= \sum_{t=1}^{P} \left( \sum_{k=1}^{N} (A_{ik} B_{kt}) \right)^{C} t_{i}$$

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	N P				
	= \(\Sin \But Ct_i\)				
	k=1 t=1				
	The state of the s				
Tanada de la comunicación de la destación de l	$= (A(BC))_{ij} = ((AB)C)_{ij}$				
	=> $(A(BC))_{ij} = ((AB)C)_{ij}$ $\forall i = 1m, j = 1q$				
Spiritualistics in the lattice of the control of the projection in the other behavior of the other tricial on	A STATE OF THE STA				
	=) (A(BC)) = ((AB)C)				
	=) Matrix multiplicath is associative.				
(6)	Dispuove commutativity of materix multiplicat !.				
	multiplicat.				
	The state of the s				
	Let A = 1 0 B = 1 1				
	Lo -I Jan LI I J				
	AB = [I o ] [II] = [I I]				
	0 -1   1   -1 -1				
	BA = [1 1 1 0 = 1 -1]				
	=(BA)				
anti-mandrinos tras tray mano latera proprieta translação do aplicaçõe autorizado de la constante de la consta	:: AB + BA matrix multiplicate is not commutative.				
	not commutative.				
******	CONTRACTOR OF THE STATE OF THE				
(c)	Lemma: Consider A & Rlxm B & Rmxn. Then the number of computations rugd to calculate AB is lmn.				
	Then the number of computations				
*	rugd to calculate AB is lmn.				
	Let com(AB) = no. of computat's negd.				
	Let com(AB) = no. of computat 1s negd. to calculate AB.				

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	com((AB)C) = com(AB) + com(DC)
	com ((AB)c) = com (AB) + com (OC) (where DERPXM D= AB) = pqM + put
	요즘 그렇게 그 없다는 하다 그 성을 가입니다. 그 집에 나는 그 그는 그를 가지 않는데 그렇게 되었다.
	com(A(BC)) = com(BC) + com(AE) (where E \in IRqxt, E = BC) = qut + pqt
	= qut + pqt
	If (AB)C is computationally more efficient than A(BC) then com ((AB)C) < com (A(BC))
	com ((AB)C) < com (A(BC))
	=) pqx+pxt < qxt+pqt
	(:: p, q, u, t e Z+)
4	=) 1 + 1 < 1 + 1
	t q p u

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