

**University of Maryland, College Park**  
**Department of Civil & Environmental Engineering**

Quiz 2, Closed Book & Notes, for 15 minutes  
February 21, 2001

ENCE 203 - Computation Methods in Civil Engineering II    Name:     SAMPLE    

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**Problem 1**


Compute the products  $AB$  and  $BA$  of the following matrices:

$$A = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 3 & 2 & 1 & 2 \\ 0 & 0.5 & 1 & 1 \end{bmatrix}$$

\*\*\* SOLUTION \*\*\*

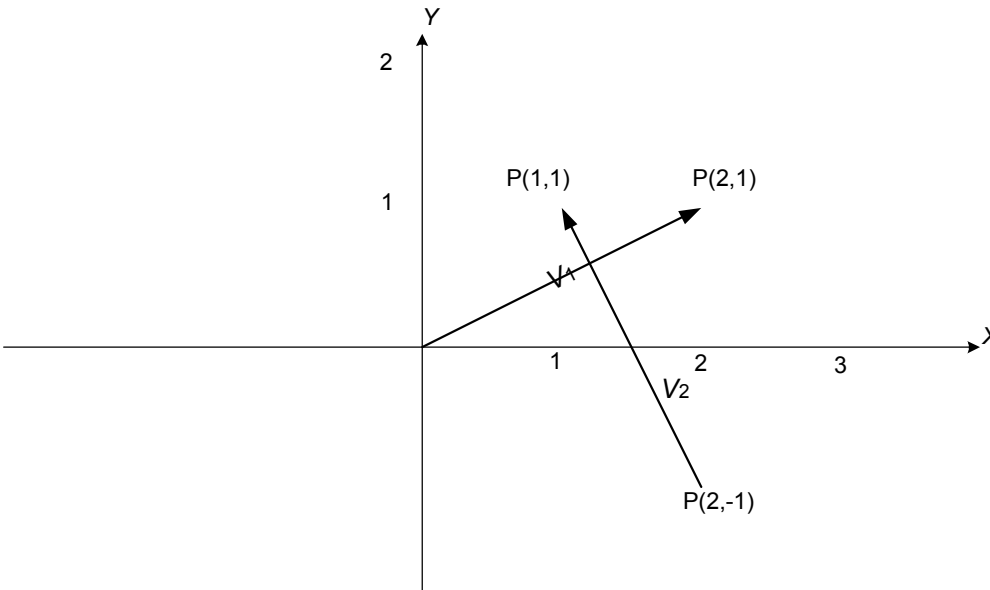
$$\begin{aligned} AB &= \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 3 & 2 & 1 & 2 \\ 0 & 0.5 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 2(3)+1(0) & 2(2)+1(0.5) & 2(1)+1(1) & 2(2)+1(1) \\ 1(3)+0(0) & 1(2)+0(0.5) & 1(1)+0(1) & 1(2)+0(1) \end{bmatrix} \\ &= \begin{bmatrix} 6 & 4.5 & 3 & 5 \\ 3 & 2 & 1 & 2 \end{bmatrix} \end{aligned}$$

$$BA = \begin{bmatrix} 3 & 2 & 1 & 2 \\ 0 & 0.5 & 1 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \Rightarrow \text{The matrix product is not defined.}$$

$(2 \times 4) \quad (2 \times 2)$   


**Problem 2**

(a) Referring to the figure shown below, find the vectors  $V_1$  and  $V_2$ .



$$V_1 = [(2-0) \quad (1-0)] = [2 \quad 1]$$

$$V_2 = [(1-2) \quad (1-[-1])] = [-1 \quad 2]$$

(b) Compute the value of  $t$  that is necessary for the following vector  $V$  to have a length of 7:

$$V = [2 \quad t \quad 6]$$

$$\|V\| = \sqrt{(2)^2 + t^2 + (6)^2} = 7$$

$$4 + t^2 + 36 = (7)^2$$

$$t^2 = 49 - 36 - 4 = 9$$

$$\therefore t = \pm 3 \quad \text{Answer}$$