

Quiz 4
Math 250

$$A = \begin{bmatrix} 1 & 4 \\ 1 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & 3 \\ 1 & 6 \\ 0 & 1 \end{bmatrix}, C = \begin{bmatrix} 0 & 3 & 2 \\ 1 & 1 & 0 \end{bmatrix}$$

Using the matrices above, find the given products if possible, or write “does not exist” if the product is not defined.

- (1) AB
- (2) BC
- (3) CB
- (4) $B^T C$
- (5) $C^T A$
- (6) $A^T C$

(1) AB does not exist. ($A : 2 \times 2, B : 3 \times 2$.)

$$(2) BC = \begin{bmatrix} 2 & 3 \\ 1 & 6 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 3 & 2 \\ 1 & 1 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 9 & 4 \\ 6 & 9 & 2 \\ 1 & 1 & 0 \end{bmatrix}$$

$$(3) CB = \begin{bmatrix} 0 & 3 & 2 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 1 & 6 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 20 \\ 3 & 9 \end{bmatrix}$$

(4) $B^T C$ does not exist. ($B^T : 2 \times 3, C : 2 \times 3$.)

$$(5) C^T A = \begin{bmatrix} 0 & 1 \\ 3 & 1 \\ 2 & 0 \end{bmatrix} \begin{bmatrix} 1 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 4 & 14 \\ 2 & 8 \end{bmatrix}$$

$$(6) A^T C = (C^T A)^T = \begin{bmatrix} 1 & 2 \\ 4 & 14 \\ 2 & 8 \end{bmatrix}^T = \begin{bmatrix} 1 & 4 & 2 \\ 2 & 14 & 8 \end{bmatrix}$$