

Name: key

Quiz 5

Justify all your work. Partial credit will be given if you show your reasoning.

1. Let $A = \begin{bmatrix} 3 & -4 \\ -5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 4 \\ 5 & k \end{bmatrix}$. What value(s) of k will make $AB = BA$?

We have

$$AB = \begin{bmatrix} 3 & -4 \\ -5 & 1 \end{bmatrix} \begin{bmatrix} 7 & 4 \\ 5 & k \end{bmatrix} = \begin{bmatrix} 1 & 12 - 4k \\ -30 & -20 + k \end{bmatrix}$$

and

$$BA = \begin{bmatrix} 7 & 4 \\ 5 & k \end{bmatrix} \begin{bmatrix} 3 & -4 \\ -5 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -24 \\ 15 - 5k & -20 + k \end{bmatrix}.$$

We see that $AB = BA$ provided $12 - 4k = -24$ and $15 - 5k = -30$. Solving either of these for k yields $k = 9$. Note that $k = 9$ satisfies both equations, as it must.

2. How many rows does C have if CD is a 2×6 matrix? How many columns does D have

When C and D are multiplied in that order the resulting matrix is a 2×6 matrix. Recall that the dimension of the product matrix is

$$(the\ number\ of\ rows\ of\ C) \times (the\ number\ of\ columns\ of\ D).$$

Thus C has 2 rows and D has 6 columns.