# MS-A0001 - Matrix Algebra, 26.10.2020-08.12.2020



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|---|---|
| **Started on** | Saturday, 7 November 2020, 6:46 PM |
| **State** | Finished |
| **Completed on** | Saturday, 7 November 2020, 7:00 PM |
| **Time taken** | 14 mins 9 secs |
| **Grade** | **2.00** out of 2.00 (**100**%) |

Quiz navigation

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Finish review

Question **1**

Flag question Mark 1.00 out of 1.00 Correct

Let $\mathrm{A}=\begin{bmatrix}8&8&2\\6&3&6\\5&2&5\end{bmatrix}$ and $\mathrm{B}=\begin{bmatrix}7&1&7\\6&7&8\\9&5&9\end{bmatrix}$.

Calculate $\mathrm{A}+\mathrm{B}$, $5\mathrm{B}$ and $\mathrm{AB}$.

$\mathrm{A}+\mathrm{B}=$

| | | |
|---|---|---|
| 15 | 9 | 9 |
| 12 | 10 | 14 |
| 14 | 7 | 14 |

Your last answer was interpreted as follows:

$$\begin{bmatrix}15&9&9\\12&10&14\\14&7&14\end{bmatrix}$$

$5\mathrm{B}=$

| | | |
|---|---|---|
| 35 | 5 | 35 |
| 30 | 35 | 40 |
| 45 | 25 | 45 |

Your last answer was interpreted as follows:

$$\begin{bmatrix}35&5&35\\30&35&40\\45&25&45\end{bmatrix}$$

$\mathrm{AB}=$

| | | |
|---|---|---|
| 122 | 74 | 138 |
| 114 | 57 | 120 |
| 92 | 44 | 96 |

Your last answer was interpreted as follows:

$$\begin{bmatrix}122&74&138\\114&57&120\\92&44&96\end{bmatrix}$$

Your answer is correct!
Your answer is correct!
The matrix sum is correct.
Marks for this submission: 0.33/0.33.
Your answer is correct!
Your answer to $5\mathrm{B}$ is correct.
Marks for this submission: 0.33/0.33.
Your answer is correct!
Your answer to $\mathrm{AB}$ is correct.
Marks for this submission: 0.33/0.33.

**Worked solution:**

$$\mathrm{A}+\mathrm{B}=\begin{bmatrix}8+7&8+1&7+2\\2\cdot 6&7+3&8+6\\9+5&5+2&9+5\end{bmatrix}=\begin{bmatrix}15&9&9\\12&10&14\\14&7&14\end{bmatrix}.$$

$$5\mathrm{B}=5\begin{bmatrix}7&1&7\\6&7&8\\9&5&9\end{bmatrix}=\begin{bmatrix}5\cdot 7&5\cdot 1&5\cdot 7\\5\cdot 6&5\cdot 7&5\cdot 8\\5\cdot 9&5\cdot 5&5\cdot 9\end{bmatrix}=\begin{bmatrix}35&5&35\\30&35&40\\45&25&45\end{bmatrix}.$$

$$\mathrm{AB}=\begin{bmatrix}8&8&2\\6&3&6\\5&2&5\end{bmatrix}\begin{bmatrix}7&1&7\\6&7&8\\9&5&9\end{bmatrix}=\begin{bmatrix}8\cdot(7)+8\cdot(6)+2\cdot(9)&8\cdot(1)+8\cdot(7)+2\cdot(5)&8\cdot(7)+8\\6\cdot(7)+3\cdot(6)+6\cdot(9)&6\cdot(1)+3\cdot(7)+6\cdot(5)&6\cdot(7)+3\\5\cdot(7)+2\cdot(6)+5\cdot(9)&5\cdot(1)+2\cdot(7)+5\cdot(5)&5\cdot(7)+2\end{bmatrix}$$

A correct answer is $\begin{bmatrix}15&9&9\\12&10&14\\14&7&14\end{bmatrix}$.
A correct answer is $\begin{bmatrix}35&5&35\\30&35&40\\45&25&45\end{bmatrix}$.
A correct answer is $\begin{bmatrix}122&74&138\\114&57&120\\92&44&96\end{bmatrix}$.

Question **2**

Flag question Mark 1.00 out of 1.00 Correct

Let $\mathrm{A}=\begin{bmatrix}2&0&2\\1&2&2\\3&1&3\end{bmatrix}$ and $\mathrm{B}=\begin{bmatrix}3&1&0\\2&1&4\\2&4&2\end{bmatrix}$. Calculate $\mathrm{AB}-\mathrm{BA}$. What can we deduce if $\mathrm{AB}-\mathrm{BA}=0$?

Answer:

| | | |
|---|---|---|
| 3 | 8 | -4 |
| -6 | 5 | -6 |
| 3 | 6 | -8 |

Your last answer was interpreted as follows:

$$\begin{bmatrix}3&8&-4\\-6&5&-6\\3&6&-8\end{bmatrix}$$

Your answer is correct!
Marks for this submission: 1.00/1.00.

**Worked solution:**

$$\begin{aligned}\mathrm{AB}&=\begin{bmatrix}2&0&2\\1&2&2\\3&1&3\end{bmatrix}\cdot\begin{bmatrix}3&1&0\\2&1&4\\2&4&2\end{bmatrix}\\&=\begin{bmatrix}2\cdot 3+0\cdot 2+2\cdot 2&2\cdot 1+0\cdot 1+2\cdot 4&2\cdot 0+0\cdot 4+2\cdot 2\\1\cdot 3+2\cdot 2+2\cdot 2&1\cdot 1+2\cdot 1+2\cdot 4&1\cdot 0+2\cdot 4+2\cdot 2\\3\cdot 3+1\cdot 2+3\cdot 2&3\cdot 1+1\cdot 1+3\cdot 4&3\cdot 0+1\cdot 4+3\cdot 2\end{bmatrix}\\&=\begin{bmatrix}10&10&4\\11&11&12\\17&16&10\end{bmatrix}\end{aligned}$$

$$\begin{aligned}\mathrm{BA}&=\begin{bmatrix}3&1&0\\2&1&4\\2&4&2\end{bmatrix}\cdot\begin{bmatrix}2&0&2\\1&2&2\\3&1&3\end{bmatrix}\\&=\begin{bmatrix}3\cdot 2+1\cdot 1+0\cdot 3&3\cdot 0+1\cdot 2+0\cdot 1&3\cdot 2+1\cdot 2+0\cdot 3\\2\cdot 2+1\cdot 1+4\cdot 3&2\cdot 0+1\cdot 2+4\cdot 1&2\cdot 2+1\cdot 2+4\cdot 3\\2\cdot 2+4\cdot 1+2\cdot 3&2\cdot 0+4\cdot 2+2\cdot 1&2\cdot 2+4\cdot 2+2\cdot 3\end{bmatrix}\\&=\begin{bmatrix}7&2&8\\17&6&18\\14&10&18\end{bmatrix}\end{aligned}$$

$$\begin{aligned}\mathrm{AB}-\mathrm{BA}&=\begin{bmatrix}10&10&4\\11&11&12\\17&16&10\end{bmatrix}-\begin{bmatrix}7&2&8\\17&6&18\\14&10&18\end{bmatrix}\\&=\begin{bmatrix}10-7&10-2&4-8\\11-17&11-6&12-18\\17-14&16-10&10-18\end{bmatrix}\\&=\begin{bmatrix}3&8&-4\\-6&5&-6\\3&6&-8\end{bmatrix}.\end{aligned}$$

Matrix $\mathrm{AB}-\mathrm{BA}$ is called the commutator of $\mathrm{A}$ and $\mathrm{B}$. If the commutator equals zero the product of the matrices commutes and if it is nonzero the matrices do not commute. In other words $\mathrm{AB}=\mathrm{BA}$ iff $\mathrm{AB}-\mathrm{BA}=0$.

A correct answer is $\begin{bmatrix}3&8&-4\\-6&5&-6\\3&6&-8\end{bmatrix}$.

Finish review

◄ Lecture 2 Lecture 4 ►