RH 1.9

MATH 5, Jones

Tejas Patel

Refrigerator Homework

9

$AB = \begin{bmatrix} 8+15 & 5k-10 \\ -12+3 & 15+k \end{bmatrix} = \begin{bmatrix} 23 & 5k-10 \\ -9 & k+15 \end{bmatrix}$

$BA = \begin{bmatrix} 8+15 & 20-5 \\ 6-3k & 15+k \end{bmatrix} = \begin{bmatrix} 23 & 15 \\ 6-3k & k+15 \end{bmatrix}$

$\boxed{6-3k=-9 \rightarrow k=5}$

25

$\begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} \begin{bmatrix} -1 \\ 6 \end{bmatrix}$

$1x-2y=-1$ and $-2x+5y=6$ Solving the system with wolfram the result is $\mathbf{b_1} = \begin{bmatrix} 7 \\ 4 \end{bmatrix}$

$\begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} \begin{bmatrix} 2 \\ -9 \end{bmatrix}$

$1x-2y=2$ and $-2x+5y=-9$ solving the system with Wolfram the result is $\mathbf{b_2} = \begin{bmatrix} -8 \\ -5 \end{bmatrix}$

29

Since there exists a nonzero vector $\mathbf{b_n}$ such that $A\mathbf{b_n} = \mathbf{0}$, this confirms that the columns of A are linearly dependent.
Since A is linearly dependent, A is not invertible, and its columns do not form a basis for the space.

31

Suppose $Ax=0$
$CAx = C0 \quad CA = I_n$
$I_n x = 0$
$x = 0$
If A had more columns than rows it would have free variables, which would lead to more than the trivial solution being a solution

32

Suppose (since Ax=b has a solution) $AD = I_m$
$\mathbf{x} = D\mathbf{b}$
$A\mathbf{x} = A(D\mathbf{b})$
$(AD)\mathbf{b} = I_m\mathbf{b}$ Since $AD = I_m$, $A\mathbf{x} = \mathbf{b}$
If A had more rows than columns it would be overdetermined, and there would be more equations than unknowns.

35

a: $3b - 2a - 4c$
b: Same as a, $3b - 2a - 4c$
c: $uv^T = \begin{bmatrix} -2 \\ 3 \\ -4 \end{bmatrix} \begin{bmatrix} a & b & c \end{bmatrix} = \begin{bmatrix} (-2)(a) & (-2)(b) & (-2)(c) \\ (3)(a) & (3)(b) & (3)(c) \\ (-4)(a) & (-4)(b) & (-4)(c) \end{bmatrix} = \begin{bmatrix} -2a & -2b & -2c \\ 3a & 3b & 3c \\ -4a & -4b & -4c \end{bmatrix}$
d:

Computer Homework: Next 10 Pages

Math 5(4314) Spring 2025 Jones Tejas Patel

Review Homework: Section 2.1 Homework | **Question 11, 2.1.42** | **HW Score:** 80%, 14.4 of 18 points **Points:** 0.8 of 1 | Close

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7
- Question 8
- Question 9
- Question 10
- Question 11

Give a formula for $(A\mathbf{Bx})^T$, where $\mathbf{x}$ is a vector and A and B are matrices of appropriate size.

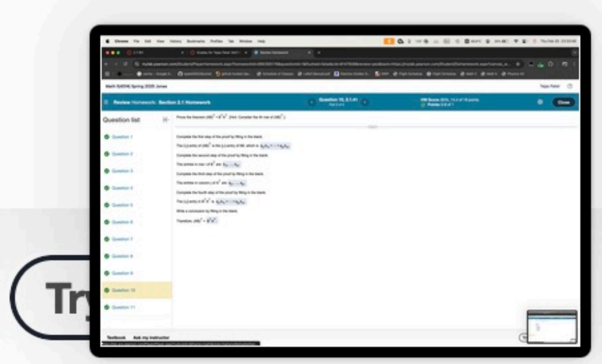
Choose the correct answer below.

A. $(AB\mathbf{x})^T = \mathbf{x}^T B^T A^T$, because $(AB\mathbf{x})^T = \mathbf{x}^T (AB)^T = \mathbf{x}^T B^T A^T$

B. $(AB\mathbf{x})^T = A^T B^T \mathbf{x}^T$, because $(AB\mathbf{x})^T = (AB)^T \mathbf{x}^T = A^T B^T \mathbf{x}^T$

C. $(AB\mathbf{x})^T = \mathbf{x}^T A^T B^T$, because $(AB\mathbf{x})^T = \mathbf{x}^T (AB)^T = \mathbf{x}^T A^T B^T$

D. $(AB\mathbf{x})^T = B^T A^T \mathbf{x}^T$, because $(AB\mathbf{x})^T = (AB)^T \mathbf{x}^T = B^T A^T \mathbf{x}^T$



Prove the theorem $(AB)^T = B^T A^T$. [Hint: Consider the ith row of $(AB)^T$.]

Complete the first step of the proof by filling in the blank.

The (i,j)-entry of $(AB)^T$ is the (j,i)-entry of AB, which is $a_{j1}b_{1i} + \cdots + a_{jn}b_{ni}$.

Complete the second step of the proof by filling in the blank.

The entries in row i of B^T are $b_{1i}, \ldots, b_{ni}$.

Complete the third step of the proof by filling in the blank.

The entries in column j of A^T are $a_{j1}, \ldots, a_{jn}$.

Complete the fourth step of the proof by filling in the blank.

The (i,j)-entry in $B^T A^T$ is $a_{j1}b_{1i} + \cdots + a_{jn}b_{ni}$.

Write a conclusion by filling in the blank.

Therefore, $(AB)^T = B^T A^T$.

Chrome File Edit View History Bookmarks Profiles Tab Window Help 1:57 47.9°C 20% Thu Feb 20 23:33:47

2.1 RH | Grades for Tejas Patel: MATH | Review Homework

mylab.pearson.com/Student/PlayerHomework.aspx?homeworkId=690355178&questionId=1&flushed=false&cId=8147608&review=yes&back=https://mylab.pearson.com/Student/DoHomework.aspx?canvas_w...

cache: - Google S... tpate0562/Quizlet github hosted das... Schedule of Classes LaTeX Manual.pdf Diamine Golden O... DRIP Flight Schedule Flight Schedule Math 2 Math 5 Physics 43

Math 5(4314) Spring 2025 Jones

Tejas Patel

Review Homework: Section 2.1 Homework

Question 9, 2.1.35
Part 4 of 4

HW Score: 80%, 14.4 of 18 points
Points: 2.4 of 3

Close

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7
- Question 8
- Question 9
- Question 10
- Question 11

View vectors in $\mathbb{R}^n$ as $n \times 1$ matrices. For **u** and **v** in $\mathbb{R}^n$, the matrix product $\mathbf{u}^T\mathbf{v}$ is a 1×1 matrix, called the scalar product, or inner product, of **u** and **v**. It is usually written as a single real number without brackets. The matrix product $\mathbf{u}\mathbf{v}^T$ is an $n \times n$ matrix, called the outer product of **u** and **v**. Let $\mathbf{u} = \begin{bmatrix} -2 \\ 6 \\ -9 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$. Compute $\mathbf{u}^T\mathbf{v}$, $\mathbf{v}^T\mathbf{u}$, $\mathbf{u}\mathbf{v}^T$, and $\mathbf{v}\mathbf{u}^T$.

$\mathbf{u}^T\mathbf{v} = -2a + 6b - 9c$

(Do not factor.)

$\mathbf{v}^T\mathbf{u} = -2a + 6b - 9c$

(Do not factor.)

$$\mathbf{u}\mathbf{v}^T = \begin{bmatrix} -2a & -2b & -2c \\ 6a & 6b & 6c \\ -9a & -9b & -9c \end{bmatrix}$$

$$\mathbf{v}\mathbf{u}^T = \begin{bmatrix} -2a & 6a & -9a \\ -2b & 6b & -9b \\ -2c & 6c & -9c \end{bmatrix}$$

Help me solve this View an example Get more help

Similar q

https://tdx.acs.pearson.com/Player/Player.aspx?cultureId=&theme=math&style=highered&disableStan...

Question list
Question 1
Question 2
Question 3
Question 4
Question 5
Question 6
Question 7
Question 8
Question 9
Question 10
Question 11

Suppose the last column of AB is entirely zero but B itself has no column of zeros. What can you say about the columns of A?

Choose the correct answer below.

A. The columns of A must be the identity matrix columns because if the last column in B is denoted $\mathbf{b}_p$, then the last column of AB can be rewritten as $A\mathbf{b}_p = \mathbf{0}$. This implies that A must be the identity matrix to ensure that the last column of AB is all zeros.

B. The columns of A must all have entries of zero because if the last column in B is denoted $\mathbf{b}_p$, then the last column of AB can be rewritten as $A\mathbf{b}_p = \mathbf{0}$. This implies that A must have columns that are composed of only zeros and therefore AB must be the zero matrix.

C. The columns of A are linearly independent because if the last column in B is denoted $\mathbf{b}_p$, then the last column of AB can be rewritten as $A\mathbf{b}_p = \mathbf{0}$. Since $\mathbf{b}_p$ is not all zeros, then the only solution to $A\mathbf{b}_p = \mathbf{0}$ is the trivial solution.

D. The columns of A are linearly dependent because if the last column in B is denoted $\mathbf{b}_p$, then the last column of AB can be rewritten as $A\mathbf{b}_p = \mathbf{0}$. Since $\mathbf{b}_p$ is not all zeros, then any solution to $A\mathbf{b}_p = \mathbf{0}$ can not be the trivial solution.

Question list

Suppose the first two columns, $\mathbf{b}_1$ and $\mathbf{b}_2$, of B are equal. What can you say about the columns of AB (if AB is defined)? Why?

Choose the correct answer below.

- A. The first two columns of AB are $A\mathbf{b}_1$ and $A\mathbf{b}_2$. They are equal since $\mathbf{b}_1$ and $\mathbf{b}_2$ are equal.
- B. Nothing can be determined about the columns of AB since the entries of A are unknown.
- C. The first two columns of AB will be equal only if the first two columns of A are equal.
- D. The first two columns of AB will be equal only if the first two rows of A are equal.

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7
- Question 8
- Question 9
- Question 10
- Question 11

If $A = \begin{bmatrix} 1 & -3 \\ -3 & 4 \end{bmatrix}$ and $AB = \begin{bmatrix} -4 & -1 & 7 \\ -3 & -2 & 3 \end{bmatrix}$, determine the first and second columns of B. Let $\mathbf{b}_1$ be column 1 of B and $\mathbf{b}_2$ be column 2 of B.

$\mathbf{b}_1 = \begin{bmatrix} 5 \\ 3 \end{bmatrix}$

$\mathbf{b}_2 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$

Math 5(4314) Spring 2025 Jones

Tejas Patel

Review Homework: Section 2.1 Homework

Question 5, 2.1.12

HW Score: 80%, 14.4 of 18 points

Points: 1.6 of 2

Close

Question list

Let $A = \begin{bmatrix} 3 & -6 \\ -2 & 4 \end{bmatrix}$. Construct a 2×2 matrix B such that AB is the zero matrix. Use two different nonzero columns for B.

$B = \begin{bmatrix} 2 & 6 \\ 1 & 3 \end{bmatrix}$

Math 5(4314) Spring 2025 Jones

Tejas Patel

Review Homework: Section 2.1 Homework

Question 4, 2.1.9

HW Score: 80%, 14.4 of 18 points
Points: 1.6 of 2

Close

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7
- Question 8
- Question 9
- Question 10
- Question 11

Let $A = \begin{bmatrix} 3 & 2 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 6 \\ -3 & k \end{bmatrix}$. What value(s) of k, if any, will make AB = BA?

Select the correct choice below and, if necessary, fill in the answer box within your choice.

A. k = −1 (Use a comma to separate answers as needed.)

B. No value of k will make AB = BA

Help me solve this | View an example | Get more help ▴

Similar q

Math 5(4314) Spring 2025 Jones

Tejas Patel

Review Homework: Section 2.1 Homework

Question 3, 2.1.7

HW Score: 80%, 14.4 of 18 points
Points: 0.8 of 1

Close

Question list

Question 1
Question 2
Question 3
Question 4
Question 5
Question 6
Question 7
Question 8
Question 9
Question 10
Question 11

If a matrix A is 5×9 and the product AB is 5×6, what is the size of B?

The size of B is 9×6.

Compute $A - 5I_3$ and $(5I_3)A$, where $A = \begin{bmatrix} 5 & -2 & 2 \\ -3 & 4 & -7 \\ -2 & 1 & 3 \end{bmatrix}$.

$$A - 5I_3 = \begin{bmatrix} 0 & -2 & 2 \\ -3 & -1 & -7 \\ -2 & 1 & -2 \end{bmatrix}$$

$$(5I_3)A = \begin{bmatrix} 25 & -10 & 10 \\ -15 & 20 & -35 \\ -10 & 5 & 15 \end{bmatrix}$$

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7
- Question 8
- Question 9
- Question 10
- Question 11

Let $A = \begin{bmatrix} 2 & -3 \\ 4 & 2 \end{bmatrix}$. Compute $3I_2 - A$ and $(3I_2)A$.

$3I_2 - A = \begin{bmatrix} 1 & 3 \\ -4 & 1 \end{bmatrix}$

(Type an integer or decimal for each matrix element.)

$(3I_2)A = \begin{bmatrix} 6 & -9 \\ 12 & 6 \end{bmatrix}$

(Type an integer or decimal for each matrix element.)

Help me solve this | View an example | Get more help ▴

Similar question | Next