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### 7.3.5 Properties

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Week 7 due Nov 20, 2023 01:42 IST

# 7.3.5 Properties

## Reading

0 points possible (ungraded)  
Read Unit 7.3.5 of the notes. [\[LINK\]](#)

☒ Done

✓

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✓ Correct

## Homework 7.3.5.1

1/1 point (graded)

Let  $\alpha \neq 0$  and  $B$  have an inverse. Then

$$(\alpha B)^{-1} = \frac{1}{\alpha} B^{-1}.$$

True

✓ Answer: True

Answer: True

$$(\alpha B)\left(\frac{1}{\alpha} B^{-1}\right) = \alpha B \frac{1}{\alpha} B^{-1} = \underbrace{\alpha \frac{1}{\alpha}}_1 \underbrace{B B^{-1}}_I = I.$$

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ⓘ Answers are displayed within the problem

## Homework 7.3.5.2

1/1 point (graded)  
Which of the following is true regardless of matrices  **$A$**  and  **$B$**  (as long as they have an inverse and are of the same size)?

☐  $(AB)^{-1} = A^{-1} B^{-1}$

☒  $(AB)^{-1} = B^{-1} A^{-1}$

☐

$(AB)^{-1} = B^{-1}A$

☐

$(AB)^{-1} = B^{-1}$



Answer: (b)

$$(AB)(B^{-1}A^{-1}) = A \underbrace{(BB^{-1})}_I A^{-1} = \underbrace{AA^{-1}}_I = I.$$

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**i** Answers are displayed within the problem

Homework 7.3.5.3

1/1 point (graded)

Let square matrices  $A$ ,  $B$ , and  $C$  have inverses  $A^{-1}$ ,  $B^{-1}$ , and  $C^{-1}$ , respectively. Then

$$(ABC)^{-1} = C^{-1}B^{-1}A^{-1}.$$

Always

Answer: Always

Answer: Always

$$(ABC)(C^{-1}B^{-1}A^{-1}) = AB \underbrace{(CC^{-1})}_I B^{-1}A^{-1} = A \underbrace{(BB^{-1})}_I A^{-1} = \underbrace{AA^{-1}}_I = I.$$

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**i** Answers are displayed within the problem

Homework 7.3.5.4

1/1 point (graded)

Let square matrix  $A$  have inverse  $A^{-1}$ . Then  $(A^T)^{-1} = (A^{-1})^T$ .

Always

Answer: Always

Answer: Always

$$A^T(A^{-1})^T = (\underbrace{A^{-1}A}_I)^T = I^T = I$$

Since  $(A^{-1})^T = (A^T)^{-1}$ , we will often write  $A^{-T}$ .

Calculator

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Homework 7.3.5.5

1/1 point (graded)

$$(A^{-1})^{-1} = A$$

Always

Answer: Always

Answer: Always

$$(A^{-1})^{-1}A^{-1} = (AA^{-1})^{-1} = I^{-1} = I$$

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