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()

12.4.3 In Preparation for this Week's Enrichment

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Week 12 due Dec 29, 2023 10:42 IST

# 12.4.3 In Preparation for this Week's Enrichment

#### No video for this unit

### Reading Assignment

0 points possible (ungraded)

Read Unit 12.4.3 of the notes. [LINK]



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✓ Correct

#### Discussion

**Topic:** Week 12 / 12.4.3

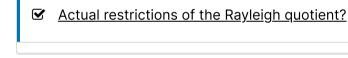
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## Homework 12.4.3.1

1/1 point (graded)

Let  $A \in \mathbb{R}^{n \times n}$  and x equal an eigenvector of A. Assume that x is real valued as is the eigenvalue  $\lambda$  with  $Ax = \lambda x$ .

 $\lambda = rac{x^T A x}{x^T x}$  is the eigenvalue associated with the eigenvector x.



Answer: Always

 $Ax=\lambda x$  implies that  $x^TAx=x^T\left(\lambda x
ight)=\lambda x^Tx$ . But  $x^Tx
eq 0$  since x is an eigenvector. Hence  $\lambda=x^TAx/\left(x^Tx
ight)$ .

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Answers are displayed within the problem

### Homework 12.4.3.2

1/1 point (graded)

Let  $A\in\mathbb{R}^{n imes n}$  be nonsingular,  $\lambda\in\Lambda\left(A
ight)$ , and  $Ax=\lambda x$ . Then  $A^{-1}x=rac{1}{\lambda}x$ .



\_

✓ Answer: TRUE

 $Ax=\lambda x$  means that  $rac{1}{\lambda}A^{-1}Ax=rac{1}{\lambda}A^{-1}\lambda x$  which means that  $rac{1}{\lambda}x=A^{-1}x$ .

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**1** Answers are displayed within the problem

Homework 12.4.3.3

10/10 points (graded)

Let  $A \in \mathbb{R}^{n imes n}$  and  $\lambda \in \Lambda\left(A
ight)$ . Then  $(\lambda - \mu) \in \Lambda\left(A - \mu I
ight)$ .

**TRUE** 

✓ Answer: TRUE

Let  $Ax=\lambda x$  for x
eq 0. Then

$$(A-\mu I)\,x=Ax-\mu Ix=Ax-\mu x=\lambda x-\mu x=(\lambda-\mu)\,x.$$

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**1** Answers are displayed within the problem

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