Quiz for Section Exam 2

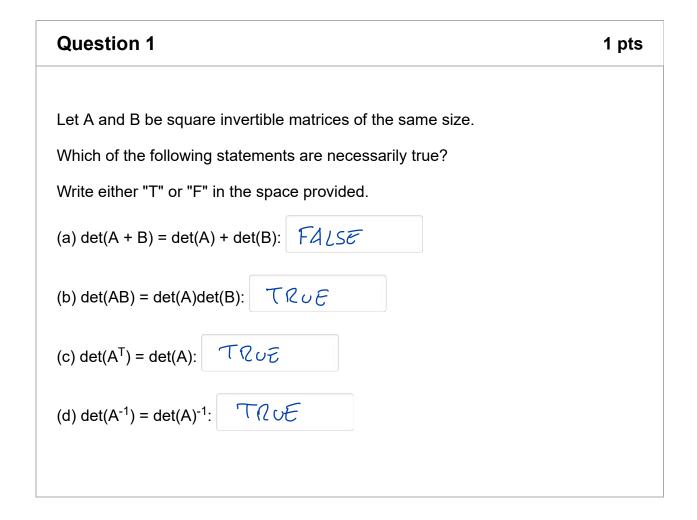
(!) This is a preview of the published version of the quiz

Started: Apr 23 at 8:04am

Quiz Instructions

This exam is timed. You have 45 minutes from the time that you start. There are 14 questions total, so do not linger if you have difficulties with one question - you only have about 3 minutes for each one.

Several of the questions ask you to identify which of a given number of statements are true or false. Be sure to write "T" or "F" in the given box (without the quotation marks). Do NOT write "t" or "f" or "true" or "false" or anything like that, just T or F.



1 of 8 4/23/2020, 8:04 AM

Question 2

1 pts

Let A be a square invertible matrix of size 3x3. What is det(2A)/det(A)?

8

Question 3

1 pts

Let $V = R^3$ denote three dimensional Euclidean space, as usual. Let L denote the set consisting of all vectors $x = [x_1, x_2, x_3]$ such that $x_1 - 2x_2 + 3x_3 = c$ for some real number c. For which values of c is L a subspace of V?

REALC: If Lis a hyperplane in Rn, then: For all c except for c=0.

- For c=0 only.
- For all c.
- Lisa subspace (=) L goes through
 the origin For no values c.

Question 4

1 pts

The matrix
$$A = \begin{bmatrix} 1 & -1 & 4 & 0 \\ 0 & 1 & -1 & -1 \\ -1 & -1 & -2 & 1 \end{bmatrix}$$
 has the RREF $B = \begin{bmatrix} 1 & 0 & 3 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$.

Which of the following statements are necessarily true?

Please fill in either "T" or "F" after each statement:

(a) The columns of A span R³. TRUE



Since Ax=b has a sol for every b.

(b) The columns of A are linearly independent. FACE

At most three vectors can be linearly incep in R3 and there are four columns.

IMPOSSIBLE!

At most three vectors can be linearly incep in R3 and there are four columns.

IMPOSSIBLE!

You need at least four vectors to spon R1 and there are only three rows.

(c) The rows of A span R4. FACE

(d) The rows of A are linearly independent. TROE

Recall that the row space.

Question 5 1 pts Let V denote the linear space of all continuous functions on the interval [-1,1]. This question asks you to identify whether certain subsets of V form subspaces. Please write "T" or "F" in the blanks provided. TRUE (a) The set of all functions f such that f(0)=0 is a subspace. FALSE (b) The set of all functions f such that f(0)=1 is a subspace. (c) The set of all functions f such that f(1)=0 is a subspace. TRUE FALSE (d))The set of all functions f such that f(1)=1 is a subspace. (e) The set of all functions f such that $\int_{-1}^{1} f(x) dx = 0$ is a subspace. TRUE

Question 6 1 pts

Let V denote the linear space of all polynomials of degree at most 2.

Which of the following statements are necessarily true?

Please write "T" or "F" in the given box.

- (a) The set $\{1,x,x^2\}$ is a basis for V. \square
- (b) The set $\{1+x,x,x^2\}$ is a basis for V. TRUE
- (c) The set $\{1+x^2,1-x^2,x^2\}$ is a basis for V. FALSE $\times \notin SPan\{1+x^2,1-x^2,x^2\}$
- (d) The set $\{1+x,2+2x,x^2\}$ is a basis for V. FACSE 2+2x=2(1+x)So the set is not

Question 7 1 pts

4 of 8 4/23/2020, 8:04 AM

Let λ be an eigenvalue of a square matrix A. Which of the following statements are necessarily true?

Fill in each blank with either "T" or "F".

(a) The set V of all vectors x such at $Ax=\lambda x$ forms a vector space.

True This is Ex, the "eigenspace"

(b) The matrix A^T also has λ as an eigenvalue. TRUE $d_{c}+(\lambda \mathcal{I}-A^T) \neq d_{c}+(\lambda \mathcal{I}-A)$

(c) det(A - AI) = 0. TRUE Since (A-AI) X=0 for the ever X

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(d) The matrix A^2 has the eigenvalue λ^2 . TRUE

If V B such that $A_V = \lambda U$, then $A^2 V = A(A_V) = A(\lambda_V) = \lambda A_V = \lambda^2 V$

Question 8 1 pts

Let A be a matrix of size n x n such that $det(A) \neq 0$.

Which of the following statements are necessarily true?

Please fill in each blank with either "T" or "F".

- (a) The rows of A form a basis for Rⁿ.
- (b) The columns of A form a basis for Rⁿ.

5 of 8 4/23/2020, 8:04 AM

1 pts

Quiz: Quiz for Section Exam 2

Question 9		
Question 5		

Let V be the linear space formed by all 3 x 3 matrices. This question asks you to identify whether certain given subsets of V form linear subspaces.

Fill in each blank with either "T" or "F" for true or false, respectively.

- (a) The set of all upper triangular matrices is a subspace. 「兄∪ら
- (b) The set of all diagonal matrices is a subspace. $\tau r c \epsilon$
- (c) The set of every matrix A such that det(A)≠0 is a subspace. FALSE

 Note that the zero motrix is not in this Set.
- (c) The set of every matrix A such that det(A)=0 is a subspace.

Question 10 1 pts

Let V denote the linear space formed by all 3 x 3 matrices. What is the dimension of V?

9

Question 11 1 pts

Let A be a square matrix for which we know that ||Ax|| = ||x|| for every vector x.

Which of the following statements are necessarily true?

Please write either "T" or "F" in the given boxes.

- (a) A is invertible. TRUE

 If $A \times = 0$, then $||x|| = (|A \times 1) = 0$, so $||x|| = (|A \times 1) = 0$,
- (b) det(A) = 1. FALSE Counterexemple: A = [-1 0 0] => det(A) = -1
- (c) If λ is an eigenvalue of A, then either $\lambda=1$ or $\lambda=-1$. TRUE

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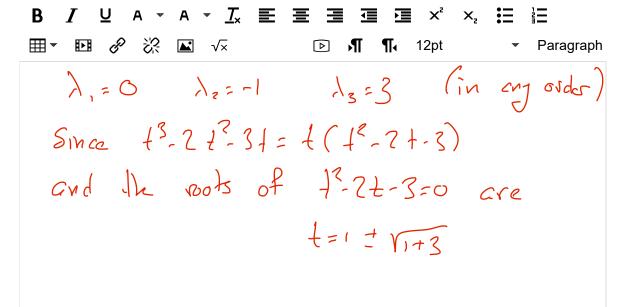
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Question 12 1 pts

For a 3 x 3 matrix A, we know that $det(tI - A) = t^3 - 2t^2 - 3t$. What are the eigenvalues of A?

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7 of 8 4/23/2020, 8:04 AM

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Question 13

1 pts

Specify the determinant of the matrix
$$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 3 & 1 \\ -1 & 0 & 7 \end{bmatrix}$$
.

Add the first row to the lest, to get

27

A = [03] Then det(A) = det(A') = 1.3.9=27

OR: Ose the "diagonals" rale: det(A) = 1.3.7 - 2.3. (-1) = 7(+6 = 27)

Question 14

1 pts

Specify the largest eigenvalue of the matrix
$$A = \begin{bmatrix} 0 & 3 & 0 \\ 0 & 0 & -2 \\ 0 & 0 & 0 \end{bmatrix}$$
.

$$P(t) = \det(tI - t) = \det\left[\begin{array}{c} t - 3 & 0 \\ 0 & t & 2 \\ 0 & 0 & t \end{array}\right] = t^{3}$$
So the only evel is $\lambda = 0$.

Quiz saved at 8:04am

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8 of 8