HW4 online

Started: 7 Apr at 15:29

Quiz instructions

READ THESE INSTRUCTIONS FIRST

1. Answer all questions.
2. You only have **one** attempt, so do not submit until you're done. You are free to leave the page and resume at a later time. (Your progress will be saved automatically.)
3. All answers should be numerical (see subsequent instructions for important formatting rules) or MCQ or T/F. For example, you should write 2 (without the quotes) instead of two.
4. If a numerical answer is an integer, you must write it as an integer instead of a fraction. For example, you must write 2 instead of 2.0 or 6/3.
5. If a numerical answer is a rational number which is not an integer, you must write it in reduced form. For example, you must write -3/2 instead of -6/4 or -1 1/2 or -1.5.
6. If you think a numerical answer is irrational or complex, you probably made a mistake.

Question 1

1 pts

Given that $\boldsymbol{A}$ and $\boldsymbol{P}$ are matrices such that $\boldsymbol{P}^{-1}\boldsymbol{A}\boldsymbol{P} = \begin{pmatrix} 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 3 \end{pmatrix}$, what is the rank of $\boldsymbol{A}$?

Question 2

1 pts

If $\boldsymbol{A}$ is an orthogonal matrix and c is a scalar, then $c\boldsymbol{A}$ is orthogonal.

- ○ True
- ◉ False

Question 3

1 pts

If $\boldsymbol{A}$, $\boldsymbol{B}$, $\boldsymbol{C}$ are orthogonal matrices of the same size , then $\boldsymbol{ABC}$ is orthogonal.

- (◉) True
- ( ) False

Question 4

1 pts

If $\mathbf{0}$ is the only eigenvalue of $\boldsymbol{A}$, then $\boldsymbol{A} = \mathbf{0}$.

- ( ) True
- (◉) False

Question 5

1 pts

Let $\boldsymbol{A}$ be a matrix. If $\boldsymbol{u}$ and $\boldsymbol{v}$ are eigenvectors of $\boldsymbol{A}$, then $\boldsymbol{u} + \boldsymbol{v}$ is an eigenvector of $\boldsymbol{A}$.

- ( ) True
- (◉) False

Question 6

1 pts

Let $\boldsymbol{A}$ be a matrix. Every two distinct eigenvectors of $\boldsymbol{A}$ are linearly independent.

- ( ) True

◉ False

Question 7 — 1 pts

Every symmetric matrix is diagonalizable.

◉ True

○ False

Question 8 — 1 pts

Every invertible matrix is diagonalizable.

○ True

◉ False

Question 9 — 1 pts

If $\boldsymbol{A}$ is a diagonalizable matrix, then $\boldsymbol{A}^{\mathrm{T}}$ is diagonalizable.

◉ True

○ False

Question 10 — 1 pts

If $\boldsymbol{A}$ is a diagonalizable matrix, then $\boldsymbol{A}^{2}$ is diagonalizable.

- (●) True
- ( ) False

Question 11

1 pts

If $\boldsymbol{A}$ and $\boldsymbol{B}$ are orthogonally diagonalizable matrices with the same size, then $\boldsymbol{AB}$ is orthogonally diagonalizable.

- ( ) True
- (●) False

Question 12

1 pts

For each $m \times n$ matrix $\boldsymbol{A}$ and each $\boldsymbol{b} \in \mathbb{R}^m$, the set of all least squares solutions to the linear system $\boldsymbol{Ax} = \boldsymbol{b}$ forms a subspace of $\mathbb{R}^n$.

- (●) True
- ( ) False

Question 13

1 pts

In $\mathbb{R}^3$, what is the distance from the point $(3\sqrt{2}, \sqrt{3}, 0)$ to the plane $x\sqrt{3} - y\sqrt{2} + z = 0$?

Question 14

1 pts

Let $\boldsymbol{A} = \begin{pmatrix} 1 & 1 & 0 \\ -2 & -1 & 2 \\ -1 & 1 & 0 \\ 2 & -2 & 0 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} -2 \\ 3 \\ -3 \\ 2 \end{pmatrix}$. The system $\boldsymbol{Ax} = \boldsymbol{b}$ has a unique least squares solution $\boldsymbol{u}$. It is: (, ,).

Question 15

1 pts

In the context of the previous question, compute the "least square error" $||\boldsymbol{b} - \boldsymbol{Au}||^2$:

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