Determinants

Practice Quiz • 15 min • 3 total points

Congratulations! You passed!

Grade received 100% To pass 100% or higher

Go to next item

1. The determinant of

1 / 1 point

$$\begin{pmatrix} -3 & 0 & -2 & 0 & 0 \\ 2 & -2 & -2 & 0 & 0 \\ 0 & 0 & -2 & 0 & 0 \\ 3 & 0 & -3 & 2 & -3 \\ -3 & 3 & 3 & 0 & -2 \end{pmatrix}$$

is equal to

- (•) 48
- ( ) 42
- ( ) -42
- ( ) -48

Correct

2. The determinant of

1 / 1 point

$$\begin{pmatrix} a & e & 0 & 0 \\ b & f & g & 0 \\ c & 0 & h & i \\ d & 0 & 0 & j \end{pmatrix}$$

is equal to

- ( ) $afhj + behj - cegj - degi$
- (•) $afhj - behj + cegj - degi$
- ( ) $agij - beij + cefj - defh$
- ( ) $agij + beij - cefj - defh$

Correct

3. Assume A and B are invertible n-by-n matrices. Which of the following identities is false?

1 / 1 point

- ( ) $\det \mathrm{A}^{-1} = 1/\det \mathrm{A}$
- ( ) $\det \mathrm{A}^{\mathrm{T}} = \det \mathrm{A}$
- (•) $\det(\mathrm{A}+\mathrm{B}) = \det \mathrm{A} + \det \mathrm{B}$
- ( ) $\det(\mathrm{AB}) = \det \mathrm{A} \det \mathrm{B}$

Correct

The Eigenvalue Problem
Practice Quiz • 15 min • 3 total points

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Go to next item

1. Which of the following are the eigenvalues of $\begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}$?

1 / 1 point

- ○ $\frac{3}{2} \pm \frac{\sqrt{3}}{2}$
- ◉ $\frac{3}{2} \pm \frac{\sqrt{5}}{2}$
- ○ $\frac{1}{2} \pm \frac{\sqrt{3}}{2}$
- ○ $\frac{1}{2} \pm \frac{\sqrt{5}}{2}$

Correct

2. Which of the following are the eigenvalues of $\begin{pmatrix} 3 & -1 \\ 1 & 3 \end{pmatrix}$?

1 / 1 point

- ○ $1 \pm 3i$
- ○ $1 \pm \sqrt{3}$
- ○ $3\sqrt{3} \pm 1$
- ◉ $3 \pm i$

Correct

3. Which of the following is an eigenvector of $\begin{pmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{pmatrix}$?

1 / 1 point

- ○ $\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$
- ◉ $\begin{pmatrix} 1 \\ \sqrt{2} \\ 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$
- ○ $\begin{pmatrix} \sqrt{2} \\ 1 \\ \sqrt{2} \end{pmatrix}$

Correct

Matrix Diagonalization
Practice Quiz • 15 min • 3 total points

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Go to next item

1. Let λ_1 and λ_2 be distinct eigenvalues of a two-by-two matrix A. Which of the following cannot be the associated eigenvectors?

1 / 1 point

- ○ $x_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}, x_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$
- ○ $x_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, x_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$
- ◉ $x_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, x_2 = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$
- ○ $x_1 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, x_2 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

Correct

2. Which matrix is equal to $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}^{100}$?

1 / 1 point

- ○ $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
- ◉ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

Correct

3. Which matrix is equal to e^{I}, where I is the two-by-two identity matrix?

1 / 1 point

- ◉ $\begin{pmatrix} e & 0 \\ 0 & e \end{pmatrix}$
- ○ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 0 & e \\ e & 0 \end{pmatrix}$
- ○ $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

Correct

Week Four Assessment
Graded Quiz • 30 min

Congratulations! You passed!

Grade received 100%

Latest Submission Grade 100%

To pass 60% or higher

Go to next item

1. The determinant of $\begin{pmatrix} 0 & 0 & 0 & 3 & 0 \\ 0 & 5 & 0 & 0 & 3 \\ 0 & 0 & -1 & 5 & 1 \\ 1 & 0 & 5 & -4 & 0 \\ 0 & 0 & 3 & -2 & -1 \end{pmatrix}$ is equal to

1 / 1 point

- ○ -30
- ○ -25
- ○ 25
- ◉ 30

Correct

2. The determinant of $\begin{pmatrix} a & b & 0 & 0 \\ 0 & c & 0 & 0 \\ 0 & e & f & g \\ 0 & 0 & h & 0 \end{pmatrix}$ is equal to

1 / 1 point

- ○ $acgh$
- ◉ $-acgh$
- ○ $-acfh$
- ○ $acfh$

Correct

3. Assume A and B are invertible n-by-n matrices. Which of the following identities is false?

1 / 1 point

- ○ $\det \mathrm{A}^{\mathrm{T}} = \det \mathrm{A}$
- ○ $\det \mathrm{A}^{-1} = 1/\det \mathrm{A}$
- ◉ $\det 2\mathrm{A} = 2 \det \mathrm{A}$
- ○ $\det(\mathrm{AB}) = \det(\mathrm{BA})$

Correct

4. Which of the following are the eigenvalues of $\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$?

1 / 1 point

- ○ -1, -3
- ○ -1, 3
- ○ 1, -3
- ◉ 1, 3

Correct

5. Which of the following are the eigenvalues of $\begin{pmatrix} 2 & 1 \\ -1 & 2 \end{pmatrix}$?

1 / 1 point

- ○ $1 \pm 2i$
- ○ $1 \pm \sqrt{2}i$
- ◉ $2 \pm i$
- ○ $\sqrt{2} \pm i$

Correct

6. Which of the following is NOT an eigenvector of $\begin{pmatrix} 1 & 2 & 0 \\ 2 & 1 & 2 \\ 0 & 2 & 1 \end{pmatrix}$?

1 / 1 point

- ◉ $\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 \\ \sqrt{2} \\ 1 \end{pmatrix}$
- ○ $\begin{pmatrix} 1 \\ -\sqrt{2} \\ 1 \end{pmatrix}$

Correct

7. Let λ_1, λ_2 and λ_3 be distinct real eigenvalues of a three-by-three matrix A. Which of the following cannot be the associated eigenvectors?

1 / 1 point

- ○ $\mathrm{x}_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \mathrm{x}_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \mathrm{x}_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$
- ○ $\mathrm{x}_1 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \mathrm{x}_2 = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \mathrm{x}_3 = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$
- ◉ $\mathrm{x}_1 = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \mathrm{x}_2 = \begin{pmatrix} 1 \\ \sqrt{2} \\ 1 \end{pmatrix}, \mathrm{x}_3 = \begin{pmatrix} 1 \\ -\sqrt{2} \\ 1 \end{pmatrix}$
- ○ $\mathrm{x}_1 = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \mathrm{x}_2 = \begin{pmatrix} 1 \\ \sqrt{2} \\ 1 \end{pmatrix}, \mathrm{x}_3 = \begin{pmatrix} 1 \\ -\sqrt{2} \\ 1 \end{pmatrix}$

Correct

8. Let A be an n-by-n matrix with distinct real eigenvalues, let S be the matrix whose columns are the eigenvectors of A, and let Λ be the diagonal matrix with eigenvalues down the diagonal. Which of the following identities is false?

1 / 1 point

- (●) $\mathrm{A} = \mathrm{S}^{-1}\Lambda\mathrm{S}$
- ( ) $\mathrm{A} = \mathrm{S}\Lambda\mathrm{S}^{-1}$
- ( ) $\Lambda = \mathrm{S}^{-1}\mathrm{A}\mathrm{S}$
- ( ) $\mathrm{AS} = \mathrm{S}\Lambda$

✓ Correct

9. Identify the diagonalization of $\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}$.

1 / 1 point

- ( ) $\begin{pmatrix} -3 & 0 \\ 0 & 4 \end{pmatrix} = \frac{1}{4}\begin{pmatrix} -3 & 1 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} -3 & 1 \\ 1 & 3 \end{pmatrix}$
- ( ) $\begin{pmatrix} -3 & 0 \\ 0 & 4 \end{pmatrix} = \frac{1}{4}\begin{pmatrix} 3 & 1 \\ 1 & -3 \end{pmatrix}\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ 1 & -3 \end{pmatrix}$
- (●) $\begin{pmatrix} -5 & 0 \\ 0 & 5 \end{pmatrix} = \frac{1}{5}\begin{pmatrix} -2 & 1 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} -2 & 1 \\ 1 & 2 \end{pmatrix}$
- ( ) $\begin{pmatrix} -5 & 0 \\ 0 & 5 \end{pmatrix} = \frac{1}{5}\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$

✓ Correct

10. The matrix $\begin{pmatrix} -3 & 4 \\ 4 & 3 \end{pmatrix}^{10}$ is equal to

1 / 1 point

- ( ) $\begin{pmatrix} 5^9 & 0 \\ 0 & 5^9 \end{pmatrix}$
- ( ) $\begin{pmatrix} -3\cdot 5^9 & 4\cdot 5^9 \\ 4\cdot 5^9 & 3\cdot 5^9 \end{pmatrix}$
- (●) $\begin{pmatrix} 5^{10} & 0 \\ 0 & 5^{10} \end{pmatrix}$
- ( ) $\begin{pmatrix} -3\cdot 5^{10} & 4\cdot 5^{10} \\ 4\cdot 5^{10} & 3\cdot 5^{10} \end{pmatrix}$

✓ Correct