Multiple choice questions - Matrices and determinants

Year: University Year 1 · 10

Question 1 If A is 2×3 and B is 3×4, then AB is

- ◯ **A.** 2×4
- ◯ **B.** 3×3
- ◯ **C.** 4×2
- ◯ **D.** undefined

Question 2 $\det \begin{pmatrix} 3 & 1 \\ 2 & 4 \end{pmatrix} =$

- ◯ **A.** 14
- ◯ **B.** 10
- ◯ **C.** 12
- ◯ **D.** -10

Question 3 $(AB)^{-1} =$

- ◯ **A.** $A^{-1}B^{-1}$
- ◯ **B.** $B^{-1}A^{-1}$
- ◯ **C.** $(BA)^{-1}$ only
- ◯ **D.** $A^T B^T$

Question 4 A square matrix is invertible iff

- ◯ **A.** $\det A = 0$
- ◯ **B.** $\det A \neq 0$
- ◯ **C.** A is symmetric
- ◯ **D.** $A = A^T$

Question 5 $\det(3A)$ for A 2×2 is

- ◯ **A.** $3 \det A$
- ◯ **B.** $6 \det A$
- ◯ **C.** $9 \det A$
- ◯ **D.** $\det A$

Question 6 Swapping two rows of a matrix

- ◯ **A.** leaves det unchanged
- ◯ **B.** changes the sign of det

- ◯ **C.** doubles det
- ◯ **D.** sets det to 0

Question 7 The inverse of $\begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$ is

- ◯ **A.** $\begin{pmatrix} -5 & 2 \\ 3 & -1 \end{pmatrix}$
- ◯ **B.** $\begin{pmatrix} 5 & -2 \\ -3 & 1 \end{pmatrix}$
- ◯ **C.** $\begin{pmatrix} 1 & 3 \\ 2 & 5 \end{pmatrix}$
- ◯ **D.** does not exist

Question 8 For an upper triangular matrix, $\det$ is

- ◯ **A.** the sum of the diagonal
- ◯ **B.** the product of the diagonal
- ◯ **C.** 0
- ◯ **D.** 1

Question 9 $(A^T)^T =$

- ◯ **A.** A
- ◯ **B.** A^{-1}
- ◯ **C.** $-A$
- ◯ **D.** A^2

Question 10 $\det(A+B) = \det A + \det B$ is

- ◯ **A.** always true
- ◯ **B.** true for symmetric A, B
- ◯ **C.** false in general
- ◯ **D.** true for invertible matrices

Answer grid - Matrices and determinants

Year: University Year 1

Question	Answer	Explanation
1	**A**	Inner sizes match; the outer sizes remain.
2	**B**	$12 - 2 = 10$.
3	**B**	Inverse reverses the order.
4	**B**	Non-zero determinant.
5	**C**	3^2.
6	**B**	Alternating property.
7	**A**	$\det = -1$.
8	**B**	Standard property.
9	**A**	Transposing twice.
10	**C**	E.g. $A = B = I_2$.