

Determinants

1. What is the determinant of $\begin{bmatrix} 5 & 4 \\ 1 & 3 \end{bmatrix}$?

- (a) 4
- (b) 11
- (c) 15
- (d) 19

2. What is the determinant of $\begin{bmatrix} 5 & 1 & 0 \\ 1 & 3 & 2 \\ 0 & -1 & 1 \end{bmatrix}$?

- (a) 0
- (b) 15
- (c) 24
- (d) 26

3. What is the determinant of $\begin{bmatrix} 5 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$?

- (a) 0
- (b) 9
- (c) 15

4. What is the determinant of $\begin{bmatrix} 5 & 2 & -1 \\ 0 & 3 & 4 \\ 0 & 0 & 1 \end{bmatrix}$?

- (a) 0
- (b) 6
- (c) 15
- (d) 22

5. Which of the following matrices are not invertible?

(a) $\begin{bmatrix} 2 & -3 \\ 3 & 2 \end{bmatrix}$

(b) $\begin{bmatrix} -2 & 3 \\ 2 & 3 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & -3 \\ -2 & 2 \end{bmatrix}$

(d) $\begin{bmatrix} 3 & -3 & 3 \\ -2 & 2 & -2 \\ 0 & 0 & 0 \end{bmatrix}$

(e) More than one of the above

(f) All of the above have inverses

6. **True or False** $\det(A + B) = \det A + \det B$. Be prepared to support your answer either with a proof (at least for the 2×2 case) or a counterexample.

7. **True or False** $\det(AB) = \det A \det B$. Be prepared to support your answer either with a proof (at least for the 2×2 case) or a counterexample.

8. Suppose the determinant of a 2×2 matrix A is equal to 3. What is the determinant of A^{-1} ?

(a) $1/3$

(b) 3

(c) 9

(d) Not enough information is given.

9. Suppose the determinant of a 2×2 matrix A is equal to 3. What is the determinant of $5A$?

(a) 3

(b) 9

(c) 15

(d) 75

(e) Not enough information is given.

10. If A is a 2×2 matrix, then $\det(kA)$ is

- (a) $k \det(A)$
- (b) $2k \det(A)$
- (c) $k^2 \det(A)$
- (d) Not enough information is given.

11. Which of the following statements is true?

- (a) If a square matrix has two identical rows then its determinant is zero.
- (b) If the determinant of a matrix is zero, then the matrix has two identical rows.
- (c) Both are true.
- (d) Neither is true.

12. Suppose the determinant of matrix A is zero. How many solutions does the system $Ax = b$ have?

- (a) 0
- (b) 1
- (c) Infinite
- (d) Not enough information is given.

13. Suppose the determinant of matrix A is zero. How many solutions does the system $Ax = 0$ have?

- (a) 0
- (b) 1
- (c) Infinite
- (d) Not enough information is given.