

Matrices and Determinants
12th Grade

Place all answers in the blank space provided. You are not expected to answer all the questions.

Note: $| \quad |$ denotes a determinant, $[\quad]$ denotes a matrix.

Q1. If $A = \begin{bmatrix} -2 & 0 & -1 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 6 \\ 1 \\ 0 \\ 2 \end{bmatrix}$, compute AB .

Q2. Find x such that $\begin{bmatrix} 2-x & 12 \\ 3 & -3-x \end{bmatrix} = 14$.

Q3. Solve the system of equations:
 $2x - 5y = 9$
 $-5x + 8y = -12$

Q4. If A is a 16×20 matrix, what are the conditions on B which ensure that AB and BA are both defined.

Q5. Let $\begin{bmatrix} 2 & 0 \\ 6 & 1 \end{bmatrix}^{2016} = \begin{bmatrix} A & B \\ C & D \end{bmatrix}$. What is A ?

Q6. The equation $0 = \begin{bmatrix} x & y & 1 \\ 17 & 24 & 1 \\ 1 & 4 & 1 \end{bmatrix}$ is the equation of a straight line. What is the slope of the line?

Q7. Find A^{-1} if $A = \begin{bmatrix} 1/2 & 0 \\ -1/12 & 1/6 \end{bmatrix}$.

Q8. For what values of x is $\begin{bmatrix} 50 & 2 \\ -2 & 10 \end{bmatrix} + x \begin{bmatrix} 0 & 1/2 \\ 1/2 & 0 \end{bmatrix}$ a singular matrix?

Q9. Find $|A|$ if $A = \begin{bmatrix} 5 & 0 & 0 & 0 & 0 \\ 0 & -1 & 9 & 0 & 0 \\ 0 & -8 & 2 & 0 & 0 \\ 0 & 0 & 0 & -3 & -7 \\ 0 & 0 & 0 & 6 & 4 \end{bmatrix}$.

Q10. If $A = \begin{bmatrix} -1 \\ 3 \\ -5 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 4 & -6 \end{bmatrix}$, compute AB .

Q11. Find a 3×3 matrix B such that $BA = 3A$ for all matrices A where BA is defined.

Q12. How many occurrences of the year 2016 appear in this test, including the answers?