

Tutorial questions-9

Find such value of k for which the matrix below is invertible

$$\begin{bmatrix} k & -1 & 4 \\ 0 & k+1 & 1 \\ 0 & 0 & k-3 \end{bmatrix}$$

a) For what value of μ is

$$\begin{pmatrix} 1 & 2 & -1 \\ 3 & 0 & 2 \\ -1 & \mu & 6 \end{pmatrix} \text{ singular ?}$$

b) For $A = \begin{pmatrix} 2 & 2\alpha - \beta & -1 \\ 3\alpha + 2\beta & 4 & 3 \\ -1 & 3 & 2 \end{pmatrix}$, obtain

values of α and β such that

$$A^T = \begin{pmatrix} 2 & -5 & -1 \\ -1 & 4 & 3 \\ -1 & 3 & 2 \end{pmatrix}$$

The solution set of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$ is:

- (a) $\{2, -3, 7\}$ (b) $\{2, 7, -9\}$ (c) $\{-2, 3, 7\}$ (d) none of these

Find the rank of the matrix:

$$\begin{pmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{pmatrix}$$

What is the inverse of $\begin{bmatrix} 4 & 1 \\ 10 & 2 \end{bmatrix}$?

(A) $\begin{bmatrix} -1 & \frac{1}{2} \\ 5 & -2 \end{bmatrix}$

(B) $\begin{bmatrix} 2 & -1 \\ -10 & 4 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 5 \\ \frac{1}{2} & 2 \end{bmatrix}$

(D) $\begin{bmatrix} -2 & \frac{1}{2} \\ 5 & -1 \end{bmatrix}$

Which matrix does *not* have an inverse?

(A) $\begin{bmatrix} 5 & 3 \\ 2 & 4 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} -3 & -3 \\ 6 & -6 \end{bmatrix}$

(D) $\begin{bmatrix} -10 & -5 \\ 8 & 4 \end{bmatrix}$

Find the rank of a matrix

$$B = \begin{pmatrix} 2 & -1 & 3 \\ 1 & 0 & 1 \\ 0 & 2 & -1 \\ 1 & 1 & 4 \end{pmatrix}$$

Find for what values of α and β the system of equations

$$\begin{cases} x + y + z = 0 \\ x + \alpha y + 2z = \beta \\ 2x + y + z = 1 \end{cases}$$

has: a) a unique solution; b) an infinite number of solutions; c) no solution?
For b), find solutions.

What condition should be placed on the parameter a so that the system

$$\begin{cases} x + 2y + 3z = 0 \\ 4x + 9y + (a + 12)z = 2 \\ -2x - 9y + (10 - 3a)z = -10 \end{cases}$$

has infinitely many solutions?

A concert audience of 400 people consists of adults, students, and children. The ticket prices are \$40 for adults, \$20 for students, and \$10 for children. The total amount of money taken in is \$10600. The number of children tickets sold is 200 less than the number of adult and student tickets in total. How many adults, students, and children are in attendance?

The school that Stefan goes to is selling tickets to a choral performance. On the first day of ticket sales the school sold 3 senior citizen tickets and 1 child ticket for a total of \$38. The school took in \$52 on the second day by selling 3 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.