Chapter-   
Determinants

**STUDY NOTE**

It is the value (or number) associated with a square matrix. Only square Matrices have their determinants. The matrices which are not square do not have their determinants.

If  is a square matrix of order ‘n’ then the determinant of A is denoted by det A or |A| and 

**The determinant of a square matrix of order 1:-**

If  is a square matrix of order 1, then 

**Example:-**  If  find 

Here, 

**The determinant of a square matrix of order – 2:-**

If  is a square matrix of order 2, the determinant of a is defined as



**Example:-**  Evaluate (i)  (ii) 

**Solution:-**  (i) 

(ii) 

**The determinant of a square matrix of order – 3:-**

The determinant of a square matrix of order -3 is the sum of the product of each element aij in the ith row (or jth column) with  times the determinant of the matrix obtained by leaving the ith row and jth column.

If 

(i) Using elements of the first row









(ii) Using elements of the second column







**Example:-** Evaluate 

**Solution:-** 

**Example:-** Solve for 

**Solution:-** 







**Example – 3** If , find x

**Solution:-** 









**Example – 4** If , then show that 

**Solution:-** Now 

……………………. (1)

And 

…………………………. (2)

From equation (1) and (2) we get 

**Example:-** If , prove that 

**Solution:-** 

 Expanding by R1, we get





………………………………. (1)

And  Expanding by R1 we get.







 ………………………. (2)

From (1) and (2) we get 

**Home Work:-**

NCERT Book – Exercise – 4.1

**Properties of Determinants:-**

**Property – 1**

The value of the determinant remains unchanged its rows and columns are interchanged.

**Example:-** Verify property 1 for 

**Solution:-** Expanding the determinant along with the first tow we have







By interchanging rows and columns, we get

 Expanding by the first column







Clearly 

Hence, property 1 proved

**Property – 2**

If any two rows (or columns) of a determinant are interchanged, then sign of determinants changes.

**Example:-** Verify property 2 for 

**Solution:-**  (As shown in the previous example)

Interchanging rows R2 and R3 e.g  we have



Expanding the determinant  along the first row, we have.







Hence property 2 is verified.

**Property – 3**

If any two rows (or columns) of a determinant are identical (all corresponding elements are the same), then the value of the determinant is zero.

**Proof:-** If we interchange identical rows (or column) of a determinant , then  does not change. However, by property – 2, it follows that  has changed its sign.

 







**Example:-** Evaluate 

**Solution:-** 





Here  are identical

**Property – 4**

If each element of a row (or a column) of a determinant is multiplied by a constant K, then its value gets multiplied by K.

**Verification:-** Let 

Expanding by R1

………………………………….. (1)

Now  be the determinant obtained by multiplying the elements of the first row by K.



Expanding by the first row





 From equation (1)

Hence, 

**Remember:-**

By this property, we can take any common factor from any one row or any one column of a given determinant

If corresponding elements of any two rows (or columns) of a determinant are proportional (in the same ratio), then its value is zero.

**Example:-**  ( R1 and R2 are proportional)

**Example:-**  Evaluate 

**Solution:-** 

 

**Homework:-**

Prove that . Using properties of determinant.

**Property – 5**

If some or all elements of a row or column of a determinant are expressed as the sum of two (or more) terms, then determinant can be expressed as a sum of two (or more) determinants.

**Example:- (1)**

(i) 

(ii) 

(iii) 

**Example – 2** Show that 

**Solution:-** 

 (by property 5 and property 3 and 4)

**Example:-** Using properties of determinants without expanding prove that 

**Solution:-** 

 RHS

**Property – 6**

If to each element of any row or column of a determinant, the equimultiples of corresponding elements of other rows (or column) are added, then the value of the determinant remains the same, i.e the value of the determinant remains same if we apply the operation



**Verification:-** Let  Now  can be written as

 





**Note:-**

(a) We can add or subtract any two-row or any two-column of a determinant then the value of the determinant remains unchanged.

(b) We also can add the entire row or all columns at a time of a determinant remain unchanged.

**Example:-**  

 

 

 

**Example – 1** Without expanding, prove that 

**Solution:-**  

Taking  common from R1

 ( R1 and R3 are identical)



**Problem NCERT Exercise – 4.2:-**

**Problem – 1,**  Using properties of the determinant show that 

**Solution:-** LHS  

 Taking common (a – b), (b – c) from R1 and R2 respect)



 By expanding by C1



 RHS

**Home Work:-**

NCERT Exercise 4.2 question number 8 (i)

**Problem – 2**

Using properties of determinants, show that 

**Solution:-**

LHS  

 Taking  common from R1 and R2 respectively

 

 Taking  common from R2

 Expanding by C1







**Problem – 3**  Using properties of Determinants show that 

**Solution:-** LHS  

 Taking common  from R1

 

 Taking  common from 

 Expanding by R1 we get







**Home Work:-**

NCERT Exercise – 4.2 Question number 10 (ii) and question number (11)

**Problem – 4** Prove that 

**Solution:-** LHS  

 Expanding along R1 we obtain









**Problem – 5** If x, y, z are different and , then show that 

**Solution:-** 

 (By property – 5)



For 1st determinant using 

For 2nd determinant taking x, y, z common from R1, R2 and R3 respectively

 



Taking out a common factor  common from R2 and R3 respectively.



, expanding by C1

Since,  and x, y, z are all different i.e 

 (Proved)

**Problem – 6** Show that 

**Solution:-** LHS = 

Taking a, b, c common from R1, R2, and R3 respectively

 Applying 

 Taking  common from

 

 Expanding by  we get



**Homework:-**

NCERT Exercise 4.2 question number (12)

**Problem No. – 7:-**

NCERT Exercise – 4.2 question (13)

Prove by using properties of determinants



**Solution:-** From LHS, taking b and a common from C1 and C2 respectively we ger.

 Now multiplying b with R1 and R2 respectively we get

 Applying 

 Taking common  from both C1 and C2 we get

 Now expanding by C1 we get





**Problem No. – 8:- NCERT Exercise 4.2 question number 14**

Prove by using properties of determinant that 

**Solution:-** From LHS taking a, b, c common from R1, R2, and R3 respectively.

 Taking a, b, c multiplying in C1, C2 and C3 respectively

 

=  Taking  common from C1

 

 (By expanding by R1)

**Problem – 9:-**  If a, b, c are positive and unequal, show that the value of the determinant  is –ve

**Solution:-** Applying 

 Taking  common from C1

 

 Expanding by C1 we get









Which is –ve 

**Problem – 10:-** If a, b, c are in AP find value of 

**Solution:-** Give a, b, c are in AP so, ....................................... (1)

From LHS Applying 





 (From equation 1)

= 0

**Problem -11:-** Show that 

**Solution:-** From LHS  and dividing by xyz we get



Taking common x, y, z from C1, C2 and C3 respectively, we get

 

 Taking common factor  from C2 and C3

 Applying 

 Applying 

 Expanding by , we get





**Aria of a Triangle:-** In co-ordinate Geometry, we have studied that area of a  whose vertices are  is given by the formula . Now we can express in the form of a determinant as 

**Note:-**

(a) The area is always a positive quantity

(b) The area of the triangle whose vertices are three collinear points is zero.

**Example – 1**

Find the area of the triangle formed by the points .

**Solution:-**

The area of the triangle formed by





**Example – 2**

Show that the points  are collinear.

**Solution:-**

To prove three points collinear, we have to prove the area formed by them is zero.

 

Expanding by C3





 Hence, collinear

**Example – 3**

Find the value of K if the area of the triangle is 4 sq. Units and verities are (K, 0), (4, 0), (0, 2).

**Solution:-** ATQ 

 (By expanding C2)





**Example – 4**

Find the equation of the line joining (1, 2) and (3, 6) using determinant

**Solution:-** Let P(x,y) be and point on the line given A(1, 2), B (3, 6).

As A, P, B points are collinear











Which is equal to the line

**Home Work:-**

NCERT (Exercise – 4.3)

**Minors and co-factors:-**

Definition of minor:- Minor of an element aij of a determinant is the determinant obtained by deleting its ith row and jth column in which element aij lines.

Minor of an element aij is denoted by Mij

**Example:-** Find minor of a12, a23, a22, a31 of 

**Solution:-**

Minor of 

Minor of 

Minor of 

Minor of 

**Definition of Co-factor:-**

Co-factor of an element aij, denoted by Aij or Cij is defined by , where  is minor of aij

**Example:-** Find the minor and cofactors of elements of 

**Solution:-**

Minor of 

Cofactor of 

Minor of 

Cofactor of 

Minor of 

Cofactor of 

Minor of 

Cofactor of 

**Note:-**

If elements of a row (or column) are multiplied with cofactors of any other, row (column) then their sum is zero.

**Example:-** 



 (Because R1 and R2 are identical)

**Note:-** If elements of a row (or column) are multiplied with cofactors of the same row (or column) then their sum is |A|.

**Example:-**

Find the minor and cofactors of the elements of the determinant  and verify it .

**Answer:-**



















So, 

**Homework:-** Exercise – 4.4 NCERT Book

**Adjoint and Inverse of a Matrix:-**

Adjoint of a matrix:- The adjoint of a square matrix  is defined as the transpose of the matrix , where Aij is the cofactor of the element aij. Adjoint of a matrix is denoted by 

Let 

Then 

**Example – 1**  Find adj A for 

**Answer:-** We have 

 

Hence 



**Note:-** For a square matrix of order 2 given by 

The adj A can also be obtained by interchanging a11 and a22 and be changing the signs of a12 and a21 i.e 

**Example:-** Find the adjoint of the matrix. 

**Solution:-**



















So, 

**Theorem – 1**

If A be any given square matrix of order n, then

= adj(A). A = |A|.I

Where I is the identity matrix of order ‘n’.

**Proof:-**

Let 

Now, 







 

Similarly, we can prove 

Hence, 

**Note:-** A square matrix A is said to be singular matrix if |A| = 0. If  then A is said to be a non-singular matrix.

**Example:-** If  Here 

So, A is a singular matrix

If 

Here,  so, A is a non-singular matrix

**Theorem:-** If A and B are non-singular matrices of the same order then AB and BA are also the non-singular matrix of the same order.

**Example:-** Let 

Here 



Here  i.e 



Here  i.e 



Hence, not singular

**Theorem:-**

The determinant of the product of matrices is equal to the product of their respective determinant is .where A and B are square matrices of the same order.

**Example:-** Let 



So, RHS = 

Now, 







So, 

**Remember:-** We know that 



Taking determinant in both sides









In general, if A is a non-singular matrix of order ‘n’ then 

**Theorem – 4**  A square matrix A is invertible if and only if A is a non singular matrix

**Proof:-** Let A be the invertible matrix of order n and I be the identity matrix of order n.

Hence, there exists a square matrix B of order n such that 

Now, 

 

Here, , hence A is non-singular

Conversely, let A be non-singular

Then 

Now 



Or , Where 

This A is invertible and 

**Example:-** If , then verify that . Also, find 

**Answer:-** We have 

Cofactors

















Here 



Now 





So, 

**Question – 1** If  , verify that 

**Solution:-** 



So,  exists



Now, 



So,  both exist and are given by



Now, 





**Question -2**

Show that the matrix  satisfies the equation , where I is the identity matrix and O is  the null matrix. Using this equation, find .

**Solution:-** We have 





Now, 



Multiplying  both sides (post multiplication)









**Question – 3** For the matrix , find the numbers a and b such that 

**Solution:-** 

Now 

Post multiplying  both sides









............................................... (1)

Now 

We have from equation (1)







By equality of matrix

 and 



**Question – 4** For the matrix  show that  hence finds .

**Solution:-** Given 

So, 





Now, 















Now, 



Post multiplying  both sides

















**Question – 5**

Let A be a non-singular square matrix of order . Then  is equal to

(a) |A| (b)  (c)  (d) 

**Solution:-** Here n = 3

We have 



**Question – 6**

If A is an invertible matrix of order 2 then  is equal to

(a) det (A) (b)  (c) 1 (d) 0

**Solution:-**  A is an invertible matrix

 A-1 exists and 

As matrix A is of order 2

Let  and 

So, 





So, 

**Theorem:-** If A and B are non-singular square matrices of the same order, then



**Proof:-**

Since A and B are non-singular square matrices of the same order. Hence, AB exists

 

We know that  ....................................... (1)

Also 









.............................. (2)

From equation (1) and (2) we get



Pre multiplying both sides







**Theorem:-** If A is an invertible square matrix then 

**Proof:-** Since A is an invertible matrix  

 is invertible 

We have





 ............................... (1)

Again 

.............................. (2)

From equation (1) and (2)



 (By canceling  both sides)

**Theorem:-** Prove that adjoint of a symmetric matrix is also a symmetric matrix.

**Proof:-** Let A be a symmetric matrix 

We know 



 adj A is a symmetric matrix

**Theorem:-** If A is a non-singular square matrix, then 

**Proof:-**

We have 

Replacing B by adj (A)

We have 



Premultiplying A both the side













**Theorem:-** If A is a non-singular matrix of order n, then 

**Proof:-** We know that 







**Problem:-**

01. If a is an invertible matrix of the order  such that , then find .

**Answer:-** 

02. If A is a square matrix of order 3 such that , then write the value of 

**Answer:-** 

03. If  , then find, 

**Answer:-** Try it. (1)

**Question – 1** If then verify that 

**Solution:-** 



So,  exists



Now, 



So,  both exist and are given by 

Now, 





**Question – 2**

Show that the matrix satisfies the equation , where I is  the identity matrix and O is  the identity matrix and O is  the null matrix. Using this equation, find .

**Solution:-** We have 

 



Now, 



Multiplying  both sides (post multiplication)









**Question – 3** For the matrix , find the numbers a and b such that 

**Solution:-** 

Now 

Post multiplying both sides









.................................... (1)

Now 

We have from (1)







By equality of matrix and 

**Question No. – 4** For the matrix . Show that  find .

**Solution:-** Given 

So, 





Now, 













 Now, 

















**Question No. – 05**

Let A be a non-singular square matrix of order . Then  is equal to

(a)  (b)  (c)  (d) 

**Solution:-** We have 



**Question No. – 06**

If A is an invertible matrix of order 2 then  is equal to

(a) det (A) (b)  (c) 1 (d) 0

**Solution:-** As a is an invertible matrix

 exists and 

As matrix a is of order 2

Let  and 

So, 





So, 

**Theorem:-**

If A and B are non-singular square matrices of the same order, then 

**Proof:-** Since A and B are non-singular square matrices of the same order.

Hence, AB exists

 

We know that .......................................... (1)

Also 











........................................ (2)

From equation (1) and (2) we get



Pre multiplying (AB) both side







**Theorem:-** If A is an invertible square matrix then 

**Proof:-** Since A is an invertible matrix



 is invertible 

We have 



........................................ (1)

Again 

.................................. (2)

From equation (1) and (2)



 By canceling  both sides

**Theorem:-** Prove that adjoint of a symmetric matrix is also a symmetric matrix.

**Proof:-**  Let a be a symmetric matrix 

We know 



 adjA is a symmetric matrix.

**Theorem:-** If A is a non-singular square matrix, then 

**Proof:-** We have  (for n order b matrix)

Replacing b by adj(A)

We have 



Pre-multiplying A both the side













**Theorem:-**

If A is a non-singular matrix of order n, then 

**Proof:-**

We know that 







**Problems:-**

01. If A is an invertible matrix of the order  such that , then find 

Answer:- 

02. If a is a square matrix of order 3 such that , then write the value of 

Answer:- 

03. If , then find, 

Answer:- Try it (1)

**Applications of determinants and Matrices:-**

We shall discuss the application of determinants and matrices for solving the system of linear equations in two or three variables and for cheeking the consistency of the system of linear equations.

**Consistent System:-**

A system of equations is said to be consistent if its solution (one or more) exists.

**Inconsistent system:-**

A system of equations is said to be inconsistent if its solution does not exist.

**Remark:-**

In this chapter, we restrict ourselves to the system of linear equations having unique solutions only i.e only one solution.

**The solution of a system of linear equations using the inverse of the matrix:-**

Consider the system of equations







Let 

Then the system of equations can be written as 

i.e 

**Case – 1** If A is a non-singular matrix, then the inverse exists. Now



 (By pre-multiplying by )





This method of solving the system of equations is known as the Matrix method.

**Case – 2** If A is a singular matrix, then |A|=0 in this case, we calculate (adjA). B

If  (0 being zero matrices) then the solution does not exist and the system of equations is called inconsistent.

If , then the system may be either consistent or inconsistent according to the system have either infinitely many solutions or no solution.

**Example – 1** Solve the system of equations ,

**Solution:-** Given  

Let 

So, 



............................................... (1)

Here 

So  exists

So has a unique solution

Now 

So,  

From equation (1) we get





Hence, 

**Example:- 2** Solve the system of equations  

**Solution:-** Here 

So,  can not be found out  the system of the equation has no solution.

**Example:- 3**

Solve the following system of equations by matrix method , , 

**Solution:-** Here 

Here 

So,  can be found out

Co-factors:-

  

  

  



So, 

 We have 









 So, By equality of matrix 

**Home Work:-** Exercise – 4.6 (NCERT Book) Question number 01 to 14

**Question No. – 01**

The sum of three numbers is 6 if we multiply the third number by 3 and add the second number to it, we get 11. By adding first and third numbers, we get double the second number, represent it algebraically and find the numbers using the matrix method.

**Solution:-** Let first, 2nd, and 3rd numbers are x, y, and z respectively.

ATQ   



Let 

We have ............................. (1)

Now, 

Now to find out adj A

Co-factors

  

  

  

So, 



From equation (1) 





So, 



 So, x = 1, y = 2 and z = 3

**Problem – 2** If  find . Using  solve the system of equations



**Solution:-** 



Therefore, A is a non-singular matrix so  exists

 





The given system can be expressed as , where



Now, 





On equating, we get x = 1, y = 2 and z = 3

**Problem – 3**

The cost of 4 kg onion, 3 kg wheat, and 2 kg rice is Rs. 60. The cost of 2 kg onion, 4 kg wheat, and 2 kg rice is Rs. 90. The cost of 6 kg onion, 2 kg wheat, and 3 kg rice is Rs. 70. Find the cost of each item kg by matrix method.

**Solution:-**

Let the cost of per kg = Rs. X

Cost of wheat per kg = Rs. Y

And the cost of rice per kg = Rs. Z

According to question 

The giver system of equations can be expressed as AX = B where







 The system has a unique solution













X = 5, y = 8 and z = 8

Thus, the cost of 1 kg onion = Rs. 5

Cost of 1 kg Wheat = Rs. 8

Cost of 1 kg Rice = Rs. 8

**Problem – 4**

If  find  and hence solve the system of linear equations



**Solution:-** We have 



So A is invertible

Let Cij be the co-factors of elements aij in , then

  

  

  





Now, the given system of equations is expressible as



Or, where 

Now, , so the given system of equations is consistent with a unique solution given by







 x = 9/5, y = 2/5 and z = 7/5

Hence, x = 9/5, y = 2/5 and z = 7/5 is the required solution.

**Problem – 5** Determine the product  and use it to solve the system of equations 

**Solution:-** Let .

Then the given product is 









.................................... (1)

The given system of equations can be written in matrix form as



Or 

The solution of this system of equations is given by









**Problem:- 06** Solve the following system of equations 

**Solution:-** Putting  in the given system of equations we get

  

The system of the equation can be expressed as



Now, 

 The system has a unique solution















  

**Questions:-**

01. If  find (i) M23 (ii) C32

02. The area of a triangle with vertices (k, 0), (1, 1), and (0, 3) is 5 sq units. Find the value of k

03. Find the area of a triangle, whose vertices are (0,3), (-1, 4), (2, 6)

04. If , find the value of 

05. Find the value of p such that the matrix  is singular

06. Write the value of 

07. If A is a square matrix satisfying , write the value of 

08. If A and B are square matrices of the same order such that |A| = 3 and AB = I, then write the value of |B|.

09. If A is a skew-symmetric matrix of order 3, write the value of |A|.

10. If  find the value of 

11. If  find |AB|

12. Find x, if 

13. If matrix , find |A|

14. Write down the adjoint of the matrix 

15. If 

16. Is the following system of equations consistent?  

17. Find the number of solutions of the system of equations  

18. If A is a scalar matrix of the order  such that  then find det A.

19. Find the value of x, such that the points (0, 2), (1, x), (3, 1) are collinear

20. For two given square matrices A and B of the same order, such that |A|=20 and |B| = -20, find |AB|

21. For the adjoint of a matrix 

22. Find the inverse of the matrix , if possible

23. If A is of order  and |A| = I, find |A|

24. If , find 

25. Write the value of the determinant 

26. Find the value of the determinant 

27. Find the value of the determinant 

28. Find the value of 

**Problems on Determinants:-**

**Problem – 1** Prove, using properties of determinants 

**Solution:-** LHS = 

 (On applying  )

 (On taking common  from )

 (On expanding along )





**Problem – 2** Prove that 

**Solution:-** 

= (On applying  )

 (On taking common  from  and  from )

 (On applying )

 (On taking common  from )

 (On expanding along )



**Problem – 3**

Prove that 

**Solution:-**



 (On applying )

 (On taking common  from )

 (On applying  )

 (On expanding along )

= RHS

**Problem – 4** Prove that 

**Solutions:-** 

 (On applying )

 (On taking common  from )

 (On applying  )

 (On expanding along )



**Problem – 5** Prove, using properties of determinates 

**Solution:-** LHS = =  (On applying )

 (On taking common  from )

 (On applying )

 (On expanding along )



**Homework:-**  NCERT Exercise – 4.2 Question number 10 (ii) and question number 11

**Problem – 6** Prove that 

**Solution:-**  LHS =  

 (Expanding along , we obtain)





 

**Problem – 5** If x, y, z are different and  then show that 

**Solution:-** 

 (By property -5)



For 1st determinant using 

For 2nd determinant taking x, y, z common from  respectively

 



Taking out a common factor  common from  respectively.



, Expanding by C1

Since  and x, y, z are all different i.e 



**Problem – 6** Show that 

**Solution:-** LHS  (Taking a, b, c common from R1, R2­ and R3 respectively)

 (Applying )

 (Taking  common from)

 

 Expanding by R1 by we get



**Home Work:-** NCERT Exercise 4.2 question number 12

**Problem – 07**

Prove by using properties of determinants 

**Solution:-** From LHS, taking b and a common from C1 and C2 respectively we get



Now multiplying b and a with R1 and R2 respectively we get

 Applying 

 Taking common  from both C1 and C2 we get



Now expanding by C1 we get





**Problem – 8** Prove by using properties of determinant that 

**Solution:-** From LHS taking a, b, c common from R1, R2 and R3 respectively

 Again a, b, c multiplying in  respectively

 

 Taking  common from C1

 

 (By expanding by R1)

**Problem – 9** If a, b, c are positive and unequal, show that the value of the determinant  is –ve

**Solution:-** Applying 

 Taking  common from C1

 

 Expanding by C1 we get









Which is –ve (since a + b + c > 0 and 

**Problem – 10** If a, b, c are in AP find value of 

**Solution:-** Given a, b, c are in AP so  ........................ (1)

From LHS applying 





 From (10)

= 0

**Problem – 11** Show that 

**Solution:-** From LHS  and dividing by xyz we get



Taking common x, y, z from C1, C2, and C3 respectively we get

 

 Taking common factor  from C2 and C3

 Applying 

 Applying 

 Expanding by R1 we get



**Problem – 12** Use properties of determinants to solve for x: 

**Solution:-** Let 

 On applying 

 On taking common  from 

 On applying 





Given that 







**Problem – 13** If  is the root of , then find the other two roots

**Solution:-** Given  =  On applying 

 On taking common 

 On applying 







Given that 





Hence, the other two required roots are 3 and 1

**Problem – 14**

Prove the following using properties of determinants: 

**Solution:-** We have 

 On operating 



 On taking  common from R1)

 On performing 



 

**Problem – 15**

Prove the following using properties of determinants: 

**Solution:-** Consider 

 By performing 

 By taking  common from 

 By performing 







**Problem – 16** Using properties of determinants, prove that 

**Solution:-** Consider 

=  By performing  and 

= 



**Problem – 17** Find the value of x satisfying the determinant equation 

**Solution:-** Using 





On operating 













**Problem – 18** Using properties of determinants prove that 

**Solution:-** LHS = 







(On taking common  from C3 in the first determinant and  from C3 in the second determinant)



**Problem – 19**  Using properties of determinant prove that 

**Solution:-** LHS apply 







 Expanding in C3





**Problem – 20** Show that the  is an isosceles triangle if the determinant



**Solution:-** We have 



On applying 





On taking common 



On applying 



On taking common 





Suppose that 



 or  or 

 or  or 

Since  is isosceles.

**Problem – 21** Prove 

**Solution:-** 

 On applying 



 On taking common 

 On applying 

 On applying 





**Multiple Choice Questions:-**

01. The value of 

(a) 42 (b) 49 (c) 412 (d) 0

02. If  then the values of x are

(a)  (b)  (c)  (d) 

03. The value of determinant  is

(a) 1 (b) -1 (c) 0 (d) 2

04. The value of  is

(a) 0 (b) 2 (c) 7 (d) -2

05. The value of  is

(a) 102 (b) 0 (c) 18 (d) 4

**Answer :-**

1. (d) 02. (a) 03. (c) 04. (a) 05. (b)