Article Side

Matrix Transpose by Jazzb

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Let A= [aij] be a matrix of order m x n .Then matrix B=[bij] of order n x m is called the transponse of a matrix A if bij = aij .In words , we can say that (I , j) th element of B is equal to (I , j)th element of A.Alternatively , we can say that a matrix obtained by interchanging the rows and columns of matrix is called the transpose of the matrix .The transpose of matrix A is denoted by Aâ€™ or AT.For Example if A = rectangular array [1 2// 5 6 //0 4]3x2 , then Aâ€™ = rectangular array[1 5 0 // 2 6 4]2 x3 .

Properties of transpose of matrix: Here are four Transpose Matrix properties listed below

1) Transpose of the transpose of a matrix is the matrix itself. For Example , Let A = rectangular array [2 3 4// 5 6 7]2 x3 , then Aâ€™ = rectangular array [2 5 // 3 6 // 4 7]3x2 . and(Aâ€™)â€ rectangular array [2 3 4// 5 6 7]2x3 = A . Then we have (Aâ€™)â€™= A

2) If A is any matrix and k is a scalar , then (kA)â€™=kAâ€™. For example , if A = rectangular array [1 2 4 5 6] and k = 2 then kA = rectangular array 2[1 2 3// 4 5 6] = rectangular array [2 4 6 //8 10 12]=> (kA)â€™ = rectangular array[2 8 // 4 10 //6 12] now Aâ€™ = rectangular array [1 4 // 2 5 6], therefore kAâ€™= 2[1 4 // 2 5 //3 6] = [2 8// 4 10 //6 12], From (i) and (ii) we get (kA)â€™=kAâ

3) For any two matrices A and B of the same order , (A+B)â€™ = Aâ€™ + Bâ€™.For example , if A = rect array[1 4 0 // 2 3 5] and B = rectangular array [3 2 1// 4 -1 3], then Aâ€™ = rectangular array [1 2// 4 3//0 5] and Bâ€™ = rectangular array[3 4// 2 -1//1 3]and A+B = rectangular array[1 4 0// 2 3 5] + rectangular array [3 2 1 //4 -1 3] = rectangular array[4 6 1//6 2 8] , therefore (A+B)â€™ = rectangular array [4 6// 6 2//1 8] â€¦(i) ,also Aâ€™ +Bâ€™ = rectangular array 3//0 5]+ rectangular array[3 4//2 -1//1 3]= rectangular array [4 6// 6 2 // 1 8]â€¦(ii), from (i) and (ii), we get (A+B)â€™= Aâ€™+Bâ€™

4) For any two matrices A and B , (AB)â€™=Bâ€™Aâ€™ where product Ab is well defined.For example if A rectangular array[1 2 3// 2 1 3] andB= rectangular array[0 2// 4 3// 1 5], Then AB = rectangular array[1 2 3// 2 1 3] * rectangular array[0 2// 4 3// 1 5]= rectangular array[11 23// 7 22], therefore (AB)â€™= rectangular array[11 7 // 23 22]â€¦â€¦(iii) , Now Aâ€™= rectangula array[1 2 //2 1 //3 3] and Bâ€™ = rectangular array [0 4 1 //2 3 5] , therefore Bâ€™Aâ€™ = rectangula array[0 4 1 // 2 3 5]* rectangular array[1 2// 2 1 // 3 3] = rectangular array[11 7 // 23 22] â€¦(iv) , from (iii)and (iv) we get (AB)â€™=Bâ€™Aâ€™

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