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Illustration 1: Construct a 3×4 matrix A = [a_{ij}], whose elements are given by a_{ij} = 2i + 3j.

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \end{bmatrix}; \quad \therefore a_{11} = 2 \times 1 + 3 \times 1 = 5; a_{12} = 2 \times 1 + 3 \times 2 = 8.$$

Solution: In this problem, I and j are the number of rows and columns respectively. By substituting the respective values of rows and columns in a_{ij} = 2i + 3j we can construct the required matrix.

We have A =.

Similarly, a_{13} = 11, a_{14}=14, a_{21} = 7, a_{22}=10, a_{23}=13, a_{24}=16,a_{31}=9, a_{32}=12, a_{33}=15, a_{34}=18

∴A=\begin{bmatrix} 5& 8& 11& 14\\ 7& 10& 13& 16\\ 9& 12& 18& 18 \end{bmatrix}A=⎣⎢⎡579810121113181416 18⎦⎥⎤.

Illustration 2: Construct a 3 x 4 matrix, whose elements are given by: a_{ij} =\frac{1}{2}|3i+j|21|3i+j|

Solution:

Method for solving this problem is the same as in the above problem.

Since {{a}_{ij}}=\frac{1}{2}|-3i+j|we\,haveaij=21 |−3i+j|wehave {{a}_{11}}=\frac{1}{2}|-3(1)+1|=\frac{1}{2}|-3+1|=\frac{1}{2}|-2|=\frac{2}{2}=1a11=21|−3(1)+1|=21|−3+1|=21 |−2|=22=1 {{a}_{12}}=\frac{1}{2}|-3(1)+2|=\frac{1}{2}|-3+2|=\frac{1}{2}|-1|=\frac{1}{2}a12=21|−3(1)+2|=21|−3+2|=21|−1|=21 {{a}_{13}}=\frac{1}{2}|-3(1)+3|=\frac{1}{2}|-3+3|=\frac{1}{2}(0)=0a13=21|−3(1)+3|=21|−3+3|=21 (0)=0 {{a}_{14}}=\frac{1}{2}|-3(1)+4|=\frac{1}{2}|-3+4|=\frac{1}{2};\,\,\,\,\,\,\,\,\,{{a}_{21}}\frac{1}{2}|-3(2)+1|=\frac{1}{2}|-6+1|=\frac{5}{2}a14=21|−3(1)+4|=21|−3+4|=21 ;a2121|−3(2)+1|=21|−6+1|=25 {{a}_{22}}=\frac{1}{2}|-

3(2)+2|=\frac{1}{2}|-6+2|=\frac{4}{2}=2;\,\,\,\,\,\,\,\,\,\,{{a}_{23}}\frac{1}{2}|-3(2)+3|=\frac{1}{2}|-6+3|=\frac{3}{2}*a*22=21|−3(2)+2|=21|−6+2|=24 =2;*a*2321|−3(2)+3|=21|−6+3|=23 {{a}_{24}}=\frac{1}{2}|-3(2)+4|=\frac{1}{2}|-6+4|=\frac{2}{2}=1;\,\,\,\,\,\,Similarly{{a}_{31}}=4,{{a}_{32}}=\frac{7}{2},{{a}_{33}}=3,{{a}_{34}}=\frac{5}{2}*a*24=21|−3(2)+4|=21 |−6+4|=22=1;*Similarlya*31=4,*a*32=27,*a*33=3,*a*34=25

Hence, the required matrix is given by A = \begin{bmatrix} 1& \frac{1}{2}& 0& \frac{1}{2} \\ \frac{5}{2}& 2& \frac{3}{2}& 1 \\ 4& \frac{7}{2}& 3& \frac{5}{2} \end{bmatrix}*A*=⎣⎡⎢⎢1254212270233211 25⎦⎤⎥⎥

Trace of a Matrix

Let A = $[a_{ij}]_{nxn}$ and B = $[b_{ij}]_{nxn}$ and λ be a scalar,

(i) tr(λA) = λ tr(A) (ii) tr(A + B) = tr(A) + tr(B) (iii) tr(AB) = tr(BA)