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| **Experiment No.** | 5 |

| **AIM:** | To solve given problems related to 2D Arrays. |
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| **Program 1** | |
| **PROBLEM STATEMENT :** | Addition of two matrices |
| **ALGORITHM:** | 1) START  2) DEFINITION OF FUNCTION “ADDMAT” HAVING PARAMETERS  “(INT MAT1[10][10],INT MAT2[10][10], INT MAT3[10][10], INT R,  INT C)” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  SET “MAT3[I][J]=MAT1[I][J]+MAT2[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  3) DEFINITION OF FUNCTION “DISPLAYMAT” HAVING  PARAMETERS “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  PRINT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  4) DEFINITION OF FUNCTION “READMAT” HAVING PARAMETERS  “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  INPUT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  5) DECLARE “A[10][10], B[10][10], C[10][10], ROW1, ROW2, COL1,  COL2”  6) PRINT “Enter the number of rows of Matrix 1 : ”  7) INPUT “ROW1”  8) PRINT “Enter the number of rows of Matrix 1 : ”  9) INPUT “COL1”  10) CALL THE FUNCTION ‘READMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  11) PRINT “MATRIX 1 :”  12) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  13) PRINT “Enter the number of rows of Matrix 2 : ”  14) INPUT “ROW2”  15) PRINT “Enter the number of rows of Matrix 2 : ”  16) INPUT “COL2”  17) CALL THE FUNCTION ‘READMAT’ PASSING ARGUMENTS  ‘ROW2’, ‘COL2’ AND ‘B’  18) PRINT “MATRIX 2 :”  19) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW2’, ‘COL2’ AND ‘B’  20) IF(ROW1=ROW2 AND COL1=COL2)  CALL THE FUNCTION ‘ADDMAT’ PASSING ARGUMENTS ‘A’,  ‘B’, ‘C’, ‘ROW1’ AND ‘COL1’  END IF  21) PRINT “Sum of two matrices is :”  22) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘C’  23) END |
| **PROGRAM:** | #include<stdio.h>  void addmat(int mat1[10][10], int mat2[10][10], int mat3[10][10], int r, int c)  {  for(int i=0;i<r;i++)  for(int j=0;j<c;j++)  mat3[i][j]=mat1[i][j]+mat2[i][j];  }  void displaymat(int r, int c, int mat[10][10])  {  for(int i=0;i<r;i++){  for(int j=0;j<c;j++)  printf("%d \t",mat[i][j]);  printf("\n");  }  }  void readmat(int r, int c, int mat[10][10])  {  printf("Enter the elements of array :\n");  for(int i=0;i<r;i++)  for(int j=0;j<c;j++)  {  scanf("%d",&mat[i][j]);  }  printf("\n");  }  int main()  {  int a[10][10],row1,col1;  int b[10][10],row2,col2;  int c[10][10];  printf("Enter the number of rows of Matrix 1 : ");  scanf("%d",&row1);  printf("Enter the number of columns Matrix 1 : ");  scanf("%d",&col1);  readmat(row1,col1,a);  printf("Matrix 1 :\n");  displaymat(row1,col1,a);  printf("\n");  printf("Enter the number of rows of Matrix 2 : ");  scanf("%d",&row2);  printf("Enter the number of columns of Matrix 2 : ");  scanf("%d",&col2);  readmat(row2,col2,b);  printf("Matrix 2 :\n");  displaymat(row2,col2,b);  printf("\n");  if(row1==row2 && col1==col2)  addmat(a,b,c,row1,col1);  printf("Sum of two matrices is :\n");  displaymat(row1,col1,c);  return 0;  } |
| **RESULT:** | |
| **Program 2** | |
| **PROBLEM STATEMENT :** | Transpose of a matrix |
| **ALGORITHM:** | 1) START  2) DEFINITION OF FUNCTION “TRANSPOSEMAT” HAVING  PARAMETERS  “(INT MAT1[10][10],INT MAT2[10][10], INT R, INT C)” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  SET “MAT2[J][I]=MAT1[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  3) DEFINITION OF FUNCTION “DISPLAYMAT” HAVING  PARAMETERS “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  PRINT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  4) DEFINITION OF FUNCTION “READMAT” HAVING PARAMETERS  “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  INPUT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  5) DECLARE “A[10][10], B[10][10], C[10][10], ROW1, COL1”  6) PRINT “Enter the number of rows of Matrix : ”  7) INPUT “ROW1”  8) PRINT “Enter the number of rows of Matrix : ”  9) INPUT “COL1”  10) CALL THE FUNCTION ‘READMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  11) PRINT “MATRIX 1 :”  12) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  13) CALL THE FUNCTION ‘TRANSPOSEMAT’ PASSING  ARGUMENTS ‘A’, ‘B’, ‘ROW1’ AND ‘COL1’  14) PRINT “Transpose of the matrix is :”  15) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘B’  16) END |
| **PROGRAM:** | #include<stdio.h>  void transposemat(int mat1[10][10], int mat2[10][10], int r, int c)  {  for(int i=0;i<r;i++)  for(int j=0;j<c;j++)  mat2[j][i]=mat1[i][j];  }  void displaymat(int r, int c, int mat[10][10])  {  for(int i=0;i<r;i++)  {  for(int j=0;j<c;j++)  printf("%d \t",mat[i][j]);  printf("\n");  }  }  void readmat(int r, int c, int mat[10][10])  {  printf("Enter the elements of array :\n");  for(int i=0;i<r;i++)  for(int j=0;j<c;j++)  {  scanf("%d",&mat[i][j]);  }  printf("\n");  }  int main()  {  int a[10][10],row1,col1;  int b[10][10];  printf("Enter the number of rows of Matrix : ");  scanf("%d",&row1);  printf("Enter the number of columns Matrix : ");  scanf("%d",&col1);  readmat(row1,col1,a);  printf("Matrix 1 :\n");  displaymat(row1,col1,a);  printf("\n");  transposemat(a,b,row1,col1);  printf("Transpose of the matrix is :\n");  displaymat(row1,col1,b);  return 0;  } |
| **RESULT:** | |
| **Program 3** | |
| **PROBLEM STATEMENT:** | Multiplication of two matrices |
| **ALGORITHM:** | 1) START  2) DEFINITION OF FUNCTION “MULTIPLYMAT” HAVING  PARAMETERS “(INT MAT1[10][10],INT MAT2[10][10], INT  MAT3[10][10], INT ROW1, INT COL1, INT ROW2, INT COL2)” :  INITIALIZE ‘I=0, J=0, K=0’  FOR(I<ROW1)  SET “I=I+1”  FOR(J<COL2)  SET “J=J+1”  SET “MAT3[I][J]=0”  END FOR LOOP  END FOR LOOP    FOR(I<ROW1)  SET “I=I+1”  FOR(J<COL2)  SET “J=J+1”  FOR(K<COL1)  SET “K=K+1,MAT3[I][J]=MAT3[I][J]+(MAT1[I][K]\*MAT2[K][J])  END FOR LOOP  END FOR LOOP  END FOR LOOP  3) DEFINITION OF FUNCTION “DISPLAYMAT” HAVING  PARAMETERS “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<ROW1)  FOR(J<COL2)  PRINT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  4) DEFINITION OF FUNCTION “READMAT” HAVING PARAMETERS  “(INT R,INT C, INT MAT[10][10])” :  INITIALIZE ‘I=0, J=0’  FOR(I<R)  FOR(J<C)  INPUT “MAT[I][J]”  SET “J=J+1”  END FOR LOOP  SET “I=I+1”  END FOR LOOP  5) DECLARE “A[10][10], B[10][10], C[10][10], ROW1, ROW2, COL1,  COL2”  6) PRINT “Enter the number of rows of Matrix 1 : ”  7) INPUT “ROW1”  8) PRINT “Enter the number of rows of Matrix 1 : ”  9) INPUT “COL1”  10) CALL THE FUNCTION ‘READMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  11) PRINT “MATRIX 1 :”  12) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL1’ AND ‘A’  13) PRINT “Enter the number of rows of Matrix 2 : ”  14) INPUT “ROW2”  15) PRINT “Enter the number of rows of Matrix 2 : ”  16) INPUT “COL2”  17) CALL THE FUNCTION ‘READMAT’ PASSING ARGUMENTS  ‘ROW2’, ‘COL2’ AND ‘B’  18) PRINT “MATRIX 2 :”  19) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW2’, ‘COL2’ AND ‘B’  20) CALL THE FUNCTION ‘MULTIPLYMAT’ PASSING ARGUMENTS  ‘A’, ‘B’, ‘C’, ‘ROW1’, ‘COL1’, ‘ROW2’ AND ‘COL2’  21) PRINT “Product of two matrices is :”  22) CALL THE FUNCTION ‘DISPLAYMAT’ PASSING ARGUMENTS  ‘ROW1’, ‘COL2’ AND ‘C’  23) END |
| **PROGRAM:** | #include<stdio.h>  void multiplymat(int mat1[10][10], int mat2[10][10], int mat3[10][10], int row1, int col1, int row2, int col2)  {  for (int i = 0; i < row1; ++i)  for (int j = 0; j < col2; ++j)  mat3[i][j] = 0;  for (int i = 0; i < row1; ++i)  for (int j = 0; j < col2; ++j)  for (int k = 0; k < col1; ++k)  mat3[i][j] += mat1[i][k] \* mat2[k][j];  }  void displaymat(int r, int c, int mat[10][10])  {  for(int i=0;i<r;i++)  {  for(int j=0;j<c;j++)  printf("%d \t",mat[i][j]);  printf("\n");  }  }  void readmat(int r, int c, int mat[10][10])  {  printf("Enter the elements of array :\n");  for(int i=0;i<r;i++)  for(int j=0;j<c;j++)  {  scanf("%d",&mat[i][j]);  }  printf("\n");  }  int main()  {  int a[10][10],row1,col1;  int b[10][10],row2,col2;  int c[10][10];  printf("Enter the number of rows of Matrix 1 : ");  scanf("%d",&row1);  printf("Enter the number of columns Matrix 1 : ");  scanf("%d",&col1);  readmat(row1,col1,a);  printf("Matrix 1 :\n");  displaymat(row1,col1,a);  printf("\n");  printf("Enter the number of rows of Matrix 2 : ");  scanf("%d",&row2);  printf("Enter the number of columns of Matrix 2 : ");  scanf("%d",&col2);  readmat(row2,col2,b);  printf("Matrix 2 :\n");  displaymat(row2,col2,b);  printf("\n");  multiplymat(a,b,c,row1,col1,row2,col2);  printf("Product of two matrices is :\n");  displaymat(row1,col2,c);  return 0;  } |
| **RESULT:** | |
| **CONCLUSION:** | Studied the application of functions to solve problems related to 2D arrays. |