**Sample programs on 2D arrays:**

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| **Matrix addition:**  **#include <stdio.h>**  **int main()**  **{**  **int r, c, a[10][10], b[10][10], sum[10][10], i, j;**  **printf("Enter number of rows(1 to 10):\n");**  **scanf("%d", &r);**  **printf("Enter number of columns(1 to 10):\n");**  **scanf("%d", &c);**  **//read elements of 1st matrix**  **printf("\nEnter elements of 1st matrix:\n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **scanf("%d",&a[i][j]);**  **}**  **}**  **//read elements of 2nd matrix**  **printf("Enter elements of 2nd matrix:\n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **scanf("%d", &b[i][j]);**  **}**  **}**  **// adding two matrices**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **sum[i][j] = a[i][j] + b[i][j];**  **}**  **}**  **// printing the result**  **printf("\n Sum of 2 matrices gives: \n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **printf("%d ", sum[i][j]);**  **}**  **printf("\n");**  **}**  **return 0;**  **}** | **Output1:**  **Enter number of rows(1 to 10):**  **2**  **Enter number of columns(1 to 10):**  **2**  **Enter elements of 1st matrix:**  **1 2**  **3 4**  **Enter elements of 2nd matrix:**  **5 6**  **7 8**  **Sum of 2 matrices gives:**  **6 8**  **10 12** |
| **Subtracting one matrix from another:**  **#include <stdio.h>**  **int main()**  **{**  **int r, c, a[10][10], b[10][10], subt[10][10], i, j;**  **printf("Enter number of rows(1 to 10):\n");**  **scanf("%d", &r);**  **printf("Enter number of columns(1 to 10):\n");**  **scanf("%d", &c);**  **printf("\nEnter elements of 1st matrix:\n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **scanf("%d",&a[i][j]);**  **}**  **}**  **printf("Enter elements of 2nd matrix:\n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **scanf("%d", &b[i][j]);**  **}**  **}**  **// subtracting B from A**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **subt[i][j] = a[i][j] - b[i][j];**  **}**  **}**  **// printing the result**  **printf("\n subtracting B from A gives: \n");**  **for(i=0;i<r;i++)**  **{**  **for(j=0;j<c;j++)**  **{**  **printf("%d ", subt[i][j]);**  **}**  **printf("\n");**  **}**  **return 0;**  **}** | **Output:**  **Enter number of rows(1 to 10):**  **3**  **Enter number of columns(1 to 10):**  **3**  **Enter elements of 1st matrix:**  **5 6 7**  **8 9 5**  **7 6 4**  **Enter elements of 2nd matrix:**  **1 2 3**  **4 1 2**  **3 2 1**  **subtracting B from A gives:**  **4 4 4**  **4 8 3**  **4 4 3** |
| **2x2 Matrix Multiplication:**  **#include <stdio.h>**  **int main()**  **{**  **int r, c, a[2][2], b[2][2], mul[2][2], i, j,k;**  **printf("\nEnter elements of 1st 2x2 matrix:\n");**  **for (i = 0; i < 2; i++)**  **{**  **for (j = 0; j < 2; j++)**  **{**  **scanf("%d", &a[i][j]);**  **}**  **}**  **printf("Enter elements of 2nd 2x2 matrix:\n");**  **for (i = 0; i < 2; i++)**  **{**  **for (j = 0; j < 2; j++)**  **{**  **scanf("%d", &b[i][j]);**  **}**  **}**  **// multiplication**  **for (i = 0; i < 2; i++)**  **{**  **for (j = 0; j < 2; j++)**  **{**  **mul[i][j]=0;**  **for (k=0;k<2;k++)**  **{**  **mul[i][j] = mul[i][j] + a[i][k] \* b[k][j];**  **}**  **}**  **}**  **// printing the result**  **printf("\nMatrix Multiplication result is: \n");**  **for (i = 0; i < 2; i++)**  **{**  **for (j = 0; j < 2; j++)**  **{**  **printf("%d ", mul[i][j]);**  **}**  **printf("\n");**  **}**  **return 0;**  **}** | **Output:**  **Enter elements of 1st 2x2 matrix:**  **1 2**  **3 4**  **Enter elements of 2nd 2x2 matrix:**  **5 6**  **7 8**  **Matrix Multiplication result is:**  **19 22**  **43 50** |
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| **Matrix Tranpose:**  **#include <stdio.h>**  **int main()**  **{**  **int a[10][10], transpose[10][10], r, c;**  **printf("Enter rows and columns:\n ");**  **scanf("%d %d", &r, &c);**  **printf("\nEnter matrix elements:\n");**  **for (int i = 0; i < r; i++)**  **{**  **for (int j = 0; j < c; j++)**  **{**  **scanf("%d", &a[i][j]);**  **}**  **}**  **// computing the transpose**  **for (int i = 0; i < r; i++)**  **{**  **for (int j = 0; j < c; j++)**  **{**  **transpose[j][i] = a[i][j];**  **}**  **}**  **// printing the transpose**  **printf("\nTranspose of the matrix:\n");**  **for (int i = 0; i < c; ++i)**  **{**  **for (int j = 0; j < r; ++j)**  **{**  **printf("%d ", transpose[i][j]);**  **}**  **printf("\n");**  **}**  **return 0;**  **}** | **Output:**  **Enter rows and columns:**  **3**  **4**  **Enter matrix elements:**  **1 2 3 4**  **5 6 7 8**  **6 5 4 3**  **Transpose of the matrix:**  **1 5 6**  **2 6 5**  **3 7 4**  **4 8 3** |
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