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1  #include <stdio.h>
2
3  void displayMatrix(int r, int c, int arr[r][c]){
4      for(int i = 0; i < r; i++){
5          {
6              if(i == 0){
7                  for(int j = 0; j < c; j++){
8                      printf("___");
9                  }
10                 printf("_\n");
11             }
12             for(int j = 0; j < c; j++){
13                 if(j == 0){
14                     printf("|");
15                 }
16                 if(arr[i][j] < 0 || arr[i][j] >= 10){
17                     printf("%d", arr[i][j]);
18                 }
19                 else{
20                     printf(" %d", arr[i][j]);
21                 }
22                 printf("|");
23             }
24             printf("\n");
25             for(int j = 0; j < c; j++){
26                 printf("___");
27             }
28             printf("_\n");
29         }
30     }
31
32     void transpose(int r, int c, int mat1[r][c], int mat2[c][r]){
33         for(int i = 0; i < c; i++){
34             for(int j = 0; j < r; j++){
35                 mat2[i][j] = mat1[j][i];
36             }
37         }
38     }
39 }
40
41 void addition(int n1, int n2, int mat1[n1][n2], int mat2[n1][n2], int mat3[n1][n2]){
42     for(int i = 0; i < n1; i++){
43         for(int j = 0; j < n2; j++){
44             mat3[i][j] = mat1[i][j] + mat2[i][j];
45         }
46     }
47 }
48
49 void subtraction(int n1, int n2, int mat1[n1][n2], int mat2[n1][n2], int mat3[n1][n2]){
50     for(int i = 0; i < n1; i++){
51         for(int j = 0; j < n2; j++){
52             mat3[i][j] = mat1[i][j] - mat2[i][j];
53         }
54     }
55 }
56
57 void multiplication(int r1, int c1, int r2, int c2, int mat1[r1][c1], int mat2[r2][c2], int mat3[r1][c2]){
58     for(int i = 0; i < r1; i++){
59         for(int j = 0; j < c2; j++){
60             mat3[i][j] = 0;
61             for(int k = 0; k < c1; k++){
62                 mat3[i][j] += mat1[i][k] * mat2[k][j];
63             }
64         }
65     }
66 }
67
68
69
70 int* minorArray(int n1, int n2, int mat[3][3]){
71     int arr[4];
72     int k = 0;
73     while(k != 4){
74         for(int i = 0; i < 3; i++){

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75     for(int j = 0; j < 3; j++){
76         if(i != n1 && j != n2){
77             arr[k] = mat[i][j];
78             k++;
79         }
80     }
81 }
82 }
83 return arr;
84 }
85
86 int main(){
87
88     // we will ask user for their choice !
89     int choice;
90     printf("Transpose -> 1\n");
91     printf("Addition -> 2\n");
92     printf("Subtraction -> 3\n");
93     printf("Multiplication -> 4\n");
94     printf("Enter your choice > \n");
95
96     scanf("%d",&choice);
97
98     if(choice == 1){
99         //first we will input a matrix by the user !
100         int r,c;
101         printf("Enter number of rows : ");
102         scanf("%d",&r);
103         printf("Enter number of columns: ");
104         scanf("%d",&c);
105
106         int mat[r][c];
107         int transposeMat[c][r];
108
109         for(int i = 0; i < r; i++){
110             for(int j = 0; j < c; j++){
111                 printf("Enter element {%d:%d} > ",i,j);
112                 int ele;
113                 scanf("%d",&ele);
114                 mat[i][j] = ele;
115             }
116         }
117         printf("\nNormal Matrix\n");
118         displayMatrix(r,c,mat);
119         transpose(r,c,mat,transposeMat);
120         printf("\nTranspose Matrix\n");
121         displayMatrix(c,r,transposeMat);
122     }
123     else if(choice == 2){
124         // we will input two matrixes by user
125         int r;
126         int c;
127         printf("Enter number of rows > ");
128         scanf("%d",&r);
129         printf("Enter number of columns > ");
130         scanf("%d",&c);
131         printf("\n");
132
133         int mat1[r][c];
134         int mat2[r][c];
135         int mat3[r][c];
136
137         printf("\n");
138         printf("First Matrix Input");
139         printf("\n");
140         for(int i = 0; i < r; i++){
141             for(int j = 0; j < c; j++){
142                 printf("Enter element {%d:%d} > ",i,j);
143                 int ele;
144                 scanf("%d",&ele);
145                 mat1[i][j] = ele;
146             }
147         }
148
149         printf("\n");

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150     printf("This is the first matrix");
151     printf("\n");
152     displayMatrix(r,c,mat1);
153
154     printf("Second Matrix Input\n");
155
156     for(int i = 0; i < r; i++){
157         for(int j = 0; j < c; j++){
158             printf("Enter element {%d:%d} > ",i,j);
159             int ele;
160             scanf("%d",&ele);
161             mat2[i][j] = ele;
162         }
163     }
164
165     printf("\n");
166     printf("This is the second matrix");
167     displayMatrix(r,c,mat2);
168     printf("\n");
169
170     addition(r,c,mat1,mat2,mat3);
171     printf("The third matrix which is formed by addition of above two matrix : \n");
172     displayMatrix(r,c,mat3);
173 }
174
175 else if(choice == 3){
176
177     // we will input two matrixes by user
178     int r;
179     int c;
180     printf("Enter number of rows > ");
181     scanf("%d",&r);
182     printf("Enter number of columns > ");
183     scanf("%d",&c);
184     printf("\n");
185
186     int mat1[r][c];
187     int mat2[r][c];
188     int mat3[r][c];
189
190     printf("\n");
191     printf("First Matrix Input");
192     printf("\n");
193
194     for(int i = 0; i < r; i++){
195         for(int j = 0; j < c; j++){
196             printf("Enter element {%d:%d} > ",i,j);
197             int ele;
198             scanf("%d",&ele);
199             mat1[i][j] = ele;
200         }
201     }
202
203     printf("\n");
204     printf("This is the first matrix");
205     printf("\n");
206     displayMatrix(r,c,mat1);
207     printf("\n");
208
209     printf("Second Matrix Input\n");
210
211     for(int i = 0; i < r; i++){
212         for(int j = 0; j < c; j++){
213             printf("Enter element {%d:%d} > ",i,j);
214             int ele;
215             scanf("%d",&ele);
216             mat2[i][j] = ele;
217         }
218     }
219     printf("\n");
220     printf("This is the first matrix");
221     printf("\n");
222     displayMatrix(r,c,mat2);
223     printf("\n");
224

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225 subtraction(r,c,mat1,mat2,mat3);
226 printf("The third matrix which is formed by subtraction of above two matrix : \n");
227 displayMatrix(r,c,mat3);
228 }
229
230 else if(choice == 4){
231     int r1;
232     int c1;
233     int r2;
234     int c2;
235
236     printf("Enter number of rows for first matrix : ");
237     scanf("%d",&r1);
238     printf("Enter number of columns for first matrix : ");
239     scanf("%d",&c1);
240     printf("Enter number of rows for second matrix : ");
241     scanf("%d",&r2);
242     printf("Enter number of columns for second matrix : ");
243     scanf("%d",&c2);
244     printf("\n");
245
246     if(c1 != r2){
247         printf("Given matrix order do not satisfy the condition for matrix multiplication");
248     }
249     else{
250         int mat1[r1][c1];
251         int mat2[r2][c2];
252         int mat3[r1][c2];
253
254         printf("\n");
255         printf("First Matrix Input");
256         printf("\n");
257
258         for(int i = 0; i < r1; i++){
259             for(int j = 0; j < c1; j++){
260                 printf("Enter element {%d:%d} > ",i,j);
261                 int ele;
262                 scanf("%d",&ele);
263                 mat1[i][j] = ele;
264             }
265         }
266
267         printf("\n");
268         printf("This is the first matrix");
269         printf("\n");
270         displayMatrix(r1,c1,mat1);
271         printf("\n");
272
273         printf("Second Matrix Input\n");
274
275         for(int i = 0; i < r2; i++){
276             for(int j = 0; j < c2; j++){
277                 printf("Enter element {%d:%d} > ",i,j);
278                 int ele;
279                 scanf("%d",&ele);
280                 mat2[i][j] = ele;
281             }
282         }
283         printf("\n");
284         printf("This is the second matrix");
285         printf("\n");
286         displayMatrix(r2,c2,mat2);
287         printf("\n");
288
289         printf("The Third Matrix which is product of above two matrix : \n");
290         multiplication(r1,c1,r2,c2,mat1,mat2,mat3);
291         displayMatrix(r1,c2,mat3);
292     }
293 }
294
295
296
297
298
299 return 0;

```

