



### ASSIGNMENT (9)

1. Write a program to define a two-dimensional array in which the size of the array is entered by the user (i.e. number of rows and columns). The user inputs the values into the array and the program calculates and prints the average of all the elements of the array. Example:

5	16	9	14
10	13	0	8
11	2	8	6

Output

The average is: 8.5

2. Write a program that asks the user to enter the values of a (5×5) array. Then, the program prints only the diagonal elements in the array. For example:

6	9	5	16	14
21	0	10	23	12
15	8	3	22	20
24	1	19	17	7
4	11	2	13	18

Output

The diagonal elements are:  
6 0 3 17 18

3. Modify the previous program to print the other opposite diagonal.

6	9	5	16	14
21	0	10	23	12
15	8	3	22	20
24	1	19	17	7
4	11	2	13	18

Output

The opposite diagonal is:  
14 23 3 1 4

4. Write a program to define three (3×4) arrays. The user inputs the values into the first two arrays and the program calculates and prints the third array which is the sum of the two corresponding arrays. Example

1	2	3	4
6	7	8	9
11	12	13	14

2	3	4	5
7	8	9	10
12	13	14	15

Output

3	5	7	9
13	15	17	19
23	25	27	29



5. Write a program that defines a two-dimensional array, in which the rows represent the students while the columns represent the courses, where the number of students and the number of courses are entered by the user. The user enters the grade of each student in every course. The program calculates the average grade for each student.

87	93	78	82	75
67	80	71	45	38
92	95	96	95	90
78	72	76	80	70

Output

Average grade of student (1) is 83.0  
Average grade of student (2) is 60.2  
Average grade of student (3) is 93.6  
Average grade of student (4) is 75.2

6. Write a program that defines a two-dimensional array, in which the size of the array is entered by the user. Then, the user inputs the values into the array (row-by-row), and the program prints the array (column-by-column).

Example:

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

Output

Column (1): 1 6 11 16  
Column (2): 2 7 12 17  
Column (3): 3 8 13 18  
Column (4): 4 9 14 19  
Column (5): 5 10 15 20

7. Write a program that defines a two-dimensional array, in which each row represents the students while each column represents the courses, where the user enters the number of students, as well as the number of courses. The user enters the grade of each student in every course, and then the program calculates the average grade for each course.

8. Write a program that defines a (4×3) array. The user inputs values into the array, and then the program calculates and prints the *maximum* value for each *row*, as well as the *minimum* value for each *column*.

9. Write a program that defines a (5×6) array. The user enters values into the array except for the last column and the last row (i.e. the user enters only the first four rows and the first five columns). Write a program that calculates the last column which contains the sum of the elements falling within the same row, and that also calculates the last row which contains the sum of elements falling within the same column. Finally, the program prints the whole array. Example:



5	9	3	4	6	27
6	7	7	5	8	33
2	0	3	1	4	10
5	5	7	6	7	30
18	21	20	16	25	100

10. Write a program that defines three matrices, in which their sizes are (2×3), (3×4), and (2×4), respectively. The user enters the first two matrices, and the program calculates and prints the third matrix, which is the product of the first two matrices. Example:

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \times \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} 14 & 20 & 26 & 32 \\ 32 & 47 & 62 & 77 \end{bmatrix}$$

*Hint: each element in the output matrix is calculated as follows:*

$$C[i][j] += A[i][k] * B[k][j] \quad \text{where} \quad 0 \leq i < 2$$

*and for each i,  $0 \leq j < 4$*

*and for each j,  $0 \leq k < 3$*