OBJECTIVES : Two-dimensional Arrays and Matrix operations

Instructors : Burcu LİMAN **Assistants :** Sıla YAPICI, Engin Z. KIRAÇBEDEL

Q1. a) Write a C program that will declare ad initialize a 3x3 integer matrix as follows;

```c
int arr[SIZE][SIZE] = { {48, 73, 14},
                        {51, 22, 98},
                        {13, 16, 27} };
```

Example Run:
```
48 73 14
51 22 98
13 16 27
```

<div align="right">

Project Name: LG17_Q1a
File Name: Q1a.cpp
</div>

b) Modify the program **Q1a.cpp** so the program reads integer numbers from the user and inserts these numbers into a 3x3 integer matrix in a **<u>row-wise</u>** operation. Then the program will display the content of the array, as shown below.

Example Run:
```
Enter the value for cell [0][0]: 10
Enter the value for cell [0][1]: 20
Enter the value for cell [0][2]: 30
Enter the value for cell [1][0]: 40
Enter the value for cell [1][1]: 50
Enter the value for cell [1][2]: 60
Enter the value for cell [2][0]: 70
Enter the value for cell [2][1]: 80
Enter the value for cell [2][2]: 90

  10  20  30
  40  50  60
  70  80  90
```

<div align="right">

Project Name: LG17_Q1b
File Name: Q1b.cpp
</div>

c) Modify the program **Q1b**.cpp so the program fills the 8x8 matrix reading the values from the text file **"nums.txt"**. then, prints the contents of the array on screen, as shown below.

Example Run:
```
The content of the matrix is:
  1   2   3   4   5   6   7   8
  2   4   6   8  10  12  14  16
  3   6   9  12  15  18  21  24
  4   8  12  16  20  24  28  32
  5  10  15  20  25  30  35  40
  6  12  18  24  30  36  42  48
  7  14  21  28  35  42  49  56
  8  16  24  32  40  48  56  64
```

nums.txt

1	2	3	4	5	6	7	8
2	4	6	8	10	12	14	16
3	6	9	12	15	18	21	24
4	8	12	16	20	24	28	32
5	10	15	20	25	30	35	40
6	12	18	24	30	36	42	48
7	14	21	28	35	42	49	56
8	16	24	32	40	48	56	64

<div align="right">

Project Name: LG17_Q1c
File Name: Q1c.cpp
</div>

Q2. Write a C program that creates a square matrix 3X3. First of all, it sets major diagonal elements to 1 and then sets minor diagonal elements of that matrix to 1 as in the example run.

Example_Run:
```
MAJOR DIAGONAL
**************
  1  0  0
  0  1  0
  0  0  1

MAJOR AND MINOR DIAGONAL
************************
  1  0  1
  0  1  0
  1  0  1
```

Project Name: LG17_Q2
File Name: Q2.cpp

Q3. Write a C program that reads letters from a text file named **"words.txt"** into a two-dim array. In each column of the array, there is an English word. For example, the word "cloud" is written in the second column and "smile" is written in the eighth column. The program will input a number and display the corresponding word from the two-dim array.

Example Run #1:
```
Which word do you want to display? 2

The word -> cloud
```

Example Run #2:
```
Which word do you want to display? 6

The word -> curse
```

words.txt
```
q c b p s c w s p d s a
u l r o l u i m l r c l
i o e i e r n i a e a o
c u a n e s d l i s r n
k d d t p e y e d s e e
```

Project Name: LG17_Q3
File Name: Q3.cpp

Q4. There are 4 players in the dart game and they make 5 shots. Gamers.txt contains 4 players and 5 shots. Write a C program that gets 4 players and 5 shots from the file into a two-dim array. The program finds each player's total score and stores them in a one-dim scores array. The third shot is important for the game, if the player's third shot is greater than or equal to 10, that player gets an extra 5 points. The program also makes the extra point calculation and displays each player's final score.

Example Run:
```
1. player score: 53
2. player score: 50
3. player score: 52
4. player score: 46
```

gamers.txt
```
17 3 12 10 6
1 20 3 19 7
8 11 14 9 5
4 13 6 5 18
```

Project Name: LG17_Q4
File Name: Q4.cpp

Additional Questions

AQ1.

Write a C program that reads IDs and 5 quiz grades of several students from **grades.txt** in order to calculate the average of each quiz, as well as the average of each student. These calculated values of the ID and the average of each student should be written onto a new file named **average.txt** while the averages of each quiz should be displayed on screen, as shown in the example run below.

Project Name: LG17_AQ1
File Name: AQ1.cpp

grades.txt:

Stu_ID	Quiz1	Quiz2	Quiz3	Quiz4	Quiz5
11	45.5	80.5	82	95	55
22	60	50	70	75	55.5
33	40	30.5	10	45	60
44	0	5	10.5	2	10
55	90	85	100	90	93
66	35	89	47.5	94	74
77	20.5	14	12	50	65
88	85	69	74	83	91.5
99	74	45	89	46	38
12	59.5	54	69	87	83

average.txt:

```
11   71.6
22   62.1
33   37.1
44    5.5
55   91.6
66   67.9
77   32.3
88   80.5
99   58.4
12   70.5
```

Example Run:

```
Quiz Number     Average
    1            50.95
    2            52.20
    3            56.40
    4            66.70
    5            62.50
```

AQ2.
Five friends play a Xbox game and they try to lose their weights. Daily waste calories lost in a week stored in a text file named **calories.txt.**

Write a C program that reads ids and waste calories from the text file into a two dimensional array, finds the average waste calory of each person in a week and stores these averages in a one-dim array. The program also decides that they can lose their weights or not according to the average waste calory. If average waste calory is higher than 2200, it means that S/he can lose their weights. Then, it writes these ids, averages and the decision to the text file named **output.txt** as in the example run.

calories.txt

```
111 1300.2   2500.4   2800.6   3400.1   4200.0
222 890.9    1400.2   2100.5   2600.3   3000.1
333 2600.4   2001.8   2140.3   1900.4   1435.9
444 2400.1   2600.3   2800.2   2950.9   3015.3
555 1800.0   2001.8   2170.8   2300.4   3000.1
```

output.txt

```
ID     AVERAGE    LOSE WEIGHT
***************************
111    2840.3        Y
222    1998.4        N
333    2015.8        N
444    2753.4        Y
555    2254.6        Y
```

Project Name: LG17_AQ2
File Name: AQ2.cpp