TK1114 Tutorial 7

Section A

Trace the code segments **using pen and paper** to print the output.
Note: Do not run the code segment using Eclipse or any other IDE. This task is to ensure you acquired strong understanding on basic concept of two dimensional.

Given the following declaration :

```
int N = 5;
int [][] arr2 = { {11, 12, 13, 14, 15},
                  {21, 22, 23, 24, 25},
                  {31, 32, 33, 34, 35},
                  {41, 42, 43, 44, 45},
                  {51, 52, 53, 54, 55}
                };
```

1. Answer the following questions:

   a) What is the value of `arr2[1][1]`, `arr2[2][2]`, `arr2[3][4]` ?

   b) What is the index of the element that stores value `35`?

   c) What is the value of `arr2.length`?

2. Trace the following code segment to determine the output.

   a)

```
int sum = 0;
for(int i = 0; i < N; i++) {
   for(int j = 0; j < N; j++) {
      sum = sum + arr2[i][j];
   }
   System.out.println(sum);
}
```

   b)

```
for(int i = 0; i < N; i++) {
int sum = 0;
   for(int j = 0; j < N; j++) {
      sum = sum + arr2[i][j];
   }
   System.out.println(sum);
}
```

c)

```
int sum = 0;
for(int i = 0; i < N; i++) {
   for(int j = 0; j <= i; j++) {
      sum = sum + arr2[i][j];
   }
   System.out.println(sum);
}
```

d)

```
int [] sum = {0, 0, 0, 0, 0};
for(int i = 0; i < N; i++) {
   for(int j = 0; j < N; j++) {
      sum[i] = sum[i] + arr2[i][j];
   }
}
for(int i = 0; i < N; i++) {
   System.out.println(i + ": " + sum[i]);
}
```

3. Given the following declaration:

```
int N = 5;
int [][] a2 = new int [N][N];
```

Trace the code segment to determine the value stored in array `a2`.

a)

```
for(int i = 0; i < N; i++) {
   for(int j = 0; j < N; j++) {
      if ((i == j) || (i + j) > 5)
         a2[i][j] = i + j;
      else
         a2[i][j] = j - i;
   }
}
```

b)

```
for(int i = 0; i < N; i++) {
   for(int j = 0; j < N; j++) {
      if ((i == j) || (i + j) > 5)
         a2[i][j] = 1;
      else
         a2[i][j] = 0;
   }
}
```

Section B

1. Write code segments for the following task. Assume that the task will be executed in the given order.

    a) Declare an array that can store 10 x 10 integers.

    b) In each of the array item, store a random number in the range of 1 – 10.

    c) Print the array elements 10 integers in a row.

    d) Sum all the elements of the array.

    e) Sum the elements of the array by rows.

    f) Sum the elements of the array by columns.

    g) Determine the row with the largest sum.

    h) Determine the column with the largest sum.

Section C: Problem Solving

Discuss the solution for the following problems:

1. There are nine students and ten multiple choice questions, and the answers are stored in a two-dimensional array. Each row records a student's answer to the questions. For example, the following array stores the students' answers to the test.

	0	1	2	3	4	5	6	7	8	9
Student 0	A	B	A	C	C	D	E	E	A	D
Student 1	D	B	A	B	C	A	E	E	A	D
Student 2	E	D	D	A	C	B	E	E	A	D
Student 3	C	B	A	E	D	C	E	E	A	D
Student 4	A	B	D	C	C	D	E	E	A	D
Student 5	B	B	E	C	C	D	E	E	A	D
Student 6	B	B	A	C	C	D	E	E	A	D
Student 7	E	B	E	C	C	D	E	E	A	D
Student 8	D	B	D	C	C	D	E	E	A	D

The key (correct answer) is stored in a one-dimensional array, as follows:

	0	1	2	3	4	5	6	7	8	9
key	D	B	D	C	C	D	A	E	A	D

Write a program that will grade the test, assuming that 1 mark is given to a correct answer and 0.25 marks is subtract for each wrong answer. Your program should read the students' answers into the two-dimensional array, grade the answer and display the marks for each student as below:

Student 0: 6.25
Student 1: 5.00
Student 2: 3.75
Student 3: 2.50
Student 4: 7.50
Student 5: 6.25
Student 6: 6.25
Student 7: 6.25
Student 8: 8.75

2. Students are required to spend at least 25 hours weekly for self-study on Programming I course. The weekly hours that students spend on self-study are stored in a two-dimensional array. Each row consists of seven columns, stores a student's seven day study hours with seven columns. For example, the following array stores the study hours for 8 students.

	Su	M	T	W	T	F	Sa
Student 0	2	4	3	4	5	8	8
Student 1	7	3	4	3	3	4	4
Student 2	3	3	0	3	3	2	2
Student 3	9	3	4	7	3	4	1
Student 4	3	5	4	3	6	3	8
Student 5	3	4	1	2	3	4	4
Student 6	3	7	4	8	3	8	4
Student 7	6	3	5	9	2	7	9

Write a program that reads the students' weekly study hours,

a) display total study hours for each student
b) find students who study less than 25 hours.
c) determine the student with the longest self-study hours.
d) determine the student with the shortest self-study hour.

3. Given the following data that represent monthly rainfall for year 2008 – 2012.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2008	3.19	7.44	3.82	7.42	3.99	7.03	2.41	8.17	5.30	10.21	17.82	16.27
2009	4.93	0.75	1.16	3.09	4.53	2.52	7.89	3.74	5.80	3.93	33.19	17.31
2010	4.05	0.47	0.73	2.47	1.00	6.67	3.00	1.06	2.41	10.65	14.17	15.17
2011	15.84	1.80	8.09	1.32	0.43	8.60	6.50	4.29	4.00	10.66	21.43	12.97
2012	8.88	0.17	3.74	2.35	6.65	1.89	3.39	2.21	6.41	2.63	2.93	26.58

Write a program that:

a) determine the month with highest rainfall for each year
b) determine the month with lowest rainfall for each year
c) calculate the average rainfall for each year
d) determine the month(s) with more than average rainfall for the year