2D Array Practice 1

Question 1. Consider the following Java code fragment. What is the value of the variable `total` after the loops finish executing?

```
int[][] matrix = {
    {3, 5, 7},
    {2, 4, 6},
    {1, 8, 9}
};
int total = 0;
for (int i = 0; i < matrix.length; i++) {
    for (int j = 0; j < matrix[i].length; j++) {
        if (i + j == 2) {
            total += matrix[i][j];
        }
    }
}
```

A) 45
B) 6
C) 16
D) 14
E) 12

Question 2. Consider the following code fragment that works with a two-dimensional array:

```
int[][] mat = {
    {2, 4, 6},
    {1, 3, 5},
    {7, 8, 9}
};
int total = 0;
for (int j = 0; j < mat[1].length; j++) {
    total += mat[1][j];
}
System.out.println(total);
```

What value is printed to the console?

A) 9
B) 10
C) 0
D) 24
E) 15

Question 3. Examine the code that creates a ragged 2-D array and then mutates one of its rows:

```
int[] row = {10, 20, 30};
int[][] data = new int[3][];
data[0] = row;
data[1] = new int[]{1, 2, 3};
data[2] = row;
row[1] = 99;
System.out.println(data[2][1]);
```

What is printed?

A) 2
B) 0
C) 99
D) 20
E) 10

Question 4. Given the following 2-D array and nested loops, what value is printed?

```
int[][] grid = {
    {5, 1, 9},
    {2, 6, 3},
    {8, 4, 7}
};
for (int i = 0; i < grid.length; i++) {
    for (int j = 0; j < grid[i].length; j++) {
        if (grid[i][j] % 2 == 0) {
            grid[i][j] = grid[i][j] / 2;
        }
    }
}
System.out.println(grid[1][1]);
```

What is the output?

A) 0
B) 6
C) 12
D) 3
E) 5

Question 5. The code below uses enhanced for-loops to count how many elements are greater than 5 in a ragged 2-D array:

```
int[][] nums = {
    {3, 4},
    {5, 6, 7},
    {8}
};
int count = 0;
for (int[] inner : nums) {
    for (int val : inner) {
        if (val > 5) {
            count++;
        }
    }
}
System.out.println(count);
```

What number is printed?

A) 3
B) 4
C) 2
D) 0
E) 5

Question 6. Consider the following code segment. What is the final value of **total** after the loops complete?

```
int[][] grid = {
    {3, 5, 7},
    {2, 4, 6},
    {1, 8, 9}
};
int total = 0;
for (int i = 0; i < grid.length; i++) {
    for (int j = 0; j < grid[i].length; j++) {
        if ((i + j) % 2 == 0) {
            total += grid[i][j];
        } else {
            total -= grid[i][j];
        }
    }
}
```

A) 4
B) -3
C) 3
D) 21
E) 45

Question 7. Examine the following code that attempts to double every value in a 2-D array using an enhanced **for** loop. What is the value of **sum** after the code executes?

```
int[][] matrix = {
    {1, 2, 3},
    {4, 5, 6}
};
for (int[] row : matrix) {
    for (int val : row) {
        val = val * 2;   // attempt to modify the array
    }
}
int sum = 0;
for (int[] row : matrix) {
    for (int v : row) {
        sum += v;
    }
}
```

A) `15`
B) `0`
C) `27`
D) `21`
E) `42`

Question 8. The code below transposes a 3 × 3 square matrix **in place**. After execution, what is the value stored in `m[2][0]`?

```
int[][] m = {
    {0, 1, 2},
    {3, 4, 5},
    {6, 7, 8}
};
for (int i = 0; i < m.length; i++) {
    for (int j = i + 1; j < m[i].length; j++) {
        int temp = m[i][j];
        m[i][j] = m[j][i];
        m[j][i] = temp;
    }
}
```

A) `0`
B) `6`
C) `8`
D) `3`
E) `2`

Question 9. A jagged (ragged) 2-D array is created and filled as shown. After the nested loops finish, what is the final value of **count**?

```
int[][] ragged = new int[3][];
ragged[0] = new int[2];   // length 2
ragged[1] = new int[4];   // length 4
ragged[2] = new int[3];   // length 3

int count = 0;
for (int i = 0; i < ragged.length; i++) {
    for (int j = 0; j < ragged[i].length; j++) {
        ragged[i][j] = i + j;
        if (ragged[i][j] % 2 == 0) {
            count++;
        }
    }
}
```

A) 4
B) 6
C) 0
D) 5
E) 9