Exercises: Arrays

Code Reading

1. What is the output of the following program?

```
public class Driver {
    public static void main(String[] args) {

        String[] strArr = new String[10];

        for (int i = strArr.length - 1; i >= 0; i--) {
            strArr[i] = "b" + (i - 1);
        }

        System.out.println("Value: " + strArr[5]);

    }
}
```

Solution:

```
Value: b4
```

2. What is the output of the following program?

```
public class Driver {
    public static void main(String[] args) {

        double[] dblArr = {3.5, 6.8, 2.3, 9.1, 1.0};

        for (int i = 0; i < dblArr.length; i++) {
            dblArr[i] /= 2;
        }

        for (int i = dblArr.length - 1; i >= 0; i--) {
            System.out.println("Value: " + dblArr[i]);
        }

    }
}
```

Solution:

```
Value: 0.5
Value: 4.55
Value: 1.15
Value: 3.4
Value: 1.75
```

3. What is the output of the following program?

```java
public class Driver {
    public static void main(String[] args) {

        int[] intArr = {1, 2, 3, 4, 5};
        double[] dblArr = {.5, 1, 1.5, 2, 2.5};

        for (int i = 0; i < intArr.length; i++) {
            dblArr[i] = dblArr[i] * intArr[i];
        }

        for (int i = 0; i < intArr.length; i++) {
            System.out.println(intArr[i] + ": " + dblArr[i]);
        }
    }
}
```

Solution:

```
1: 0.5
2: 2.0
3: 4.5
4: 8.0
5: 12.5
```

4. What is the output of the following program?

```java
public class Driver {
    public static void main(String[] args) {

        int[] intArr = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};

        for (int i = 0; i < intArr.length; i += 3) {
            System.out.println("Value: " + intArr[i]);
        }
    }
}
```

Solution:

```
Value: 1
Value: 4
Value: 7
Value: 10
```

For each of the following questions, identify whether or not the given Java program is correct by writing **Correct** or **Incorrect**. For a Java program to be **Correct** it must both compile and run without errors. If the program is **Correct**, then write out what would be displayed to the console, if anything. If the program is **Incorrect**, then briefly explain why.

5. Is the following program correct?

```
public class Driver {
    public static void main(String[] args) {
        int[] intArr = {1, 2, 3, 4, 5, 6, 7, 8, 9};
        for (int i = 1; i <= 9; i += 2) {
            System.out.print(intArr[i] + ", ");
        }
    }
}
```

Solution: Incorrect: An `ArrayIndexOutOfBoundsException` would be thrown when attempting to print `intArr[9]`, as the array only has indices 0-8.

6. Is the following program correct?

```
public class Driver {
    public static void main(String[] args) {
        String[] strArr = new String[5];
        String sep = "";
        for (int i = 0; i < strArr.length; i++) {
            System.out.print(sep + strArr[i]);
            sep = ", ";
        }
    }
}
```

Solution: Correct. Output is:

```
null, null, null, null, null
```

7. Is the following program correct?

```
public class Driver {
    public static void main(String[] args) {
        int[] intArr = new int[5];
        for (int i = 0; i < intArr.length; i++) {
            intArr[i] = i * 2;
        }
        for (int i = 0; i < intArr.length; i++) {
            System.out.print(intArr[i] + ", ");
        }
    }
}
```

Solution: Correct. Output is:

```
0, 2, 4, 6, 8,
```

Code Writing

8. Declare and instantiate on a single line a one-dimensional array called `strArr` that holds 50 Strings.

Solution:

```
String[] strArr = new String[50];
```

9. Declare on one line and instantiate on a second line a one-dimensional array called `strArr` that holds 50 Strings.

Solution:

```
String[] strArr;
strArr = new String[50];
```

10. Initialize every position in `strArr` to a backslash. Do **not** hardcode the length of the array in any way.

Solution:

```
for (int i = 0; i < strArr.length; i++) {
    strArr[i] = "\\";
}
```

11. Starting at the end of `strArr` and working back toward the beginning, display each index and the element stored at that index, separated by a colon (`:`). Each entry should be displayed on a separate line. Do **not** hardcode the length of the array in any way.

Solution:

```
for (int i = strArr.length - 1; i >= 0; i--) {
    System.out.println(i + ": " + strArr[i]);
}
```

12. Consider the array `intArr` below, which has been filled with random numbers. Fill in the code to sort the array from smallest to largest.

```
Random rand = new Random();
int[] intArr = new int[50];

for (int i = 0; i < intArr.length; i++) {
    intArr[i] = rand.nextInt(50);
}
```

Solution:

```
for (int i = 0; i < intArr.length; i++) {

    int indexOfMin = i;
    for (int j = i + 1; j < intArr.length; j++) {
        if (intArr[j] < intArr[indexOfMin]) {
            indexOfMin = j;
        }
    }

    if (indexOfMin != i) {
        int tmp = intArr[i];
        intArr[i] = intArr[indexOfMin];
        intArr[indexOfMin] = tmp;
    }
}
```

13. Declare and instantiate on a single line a two-dimensional array called `intArr` that holds `int` values and has 5 rows and 8 columns.

Solution:

```
int[][] intArr = new int[5][8];
```

14. Declare one one line and instantiate on a second line a two-dimensional array called `intArr` that holds `int` values and has 5 rows and 8 columns.

Solution:

```
int[][] intArr;
intArr = new int[5][8];
```

15. Declare on one line a two-dimensional array of `int` values called `intArr`. On the second line, allocate memory for 5 rows. On subsequent lines, allocate memory for each row to have 8 columns.

Solution:

```
int[][] intArr;
intArr = new int[5][];
for (int i = 0; i < intArr.length; i++) {
    intArr[i] = new int[8];
}
```

16. Fill in each cell of the `intArr` array from the previous question with the result of multiplying that cell's column index by its row index. Do **not** hardcode the length of the array in any way.

Solution:

```
for (int row = 0; row < intArr.length; row++) {
    for (int col = 0; col < intArr[row].length; col++) {
        intArr[row][col] = row * col;
    }
}
```

17. Print each row of the `intArr` array from the previous question in order on separate lines. Entries should be separated by a single space. The last entry in each row should be followed by a colon (:) and then the sum of the entries in that row. Do **not** hardcode the length of the array in any way.

Solution:

```
for (int row = 0; row < intArr.length; row++) {
    int rowSum = 0;
    for (int col = 0; col < intArr[row].length; col++) {
        System.out.print(intArr[row][col] + " ");
        rowSum += intArr[row][col];
    }
    System.out.println(": " + rowSum);
}
```