Montgomery College, CMSC 203
Worksheet 3
Module 10

Objective

- One dimensional , 2D Arrays

Questions

1) Which of the following array declarations are invalid?

a) `int[] grades = new int[5];`
b) `int grades[] = new int[5];`
c) `int[] grades = { 91, 83, 42, 100, 77 };`
d) all of the above are valid
e) none of the above are valid

Answer: d
Explanation: All three of these are valid array declarations. Choice b uses an alternate syntax. Choice c uses an initializer list to initialize the array.

2) Which of the following is a true statement?

a) Arrays are passed as parameters to methods like primitive types.
b) Arrays are passed as parameters to methods like object types.
c) Arrays cannot be passed as parameters to methods.
d) All of the above are true.
e) None of the above are true.

Answer: b
Explanation: Arrays are passed to methods by reference. This means that if the content of the array is changed in a method, the change will be reflected in the calling method.

3) Suppose we have an array of `String` objects identified by the variable `names`. Which of the following `for` loops will *not* correctly process each element in the array.

a) `for(int i = 0; i < names.length; i++)`
b) `for(String name : names)`
c) `for(int i = 0; i < names.length(); i++)`
d) none of these will correctly process each element
e) all of these will correctly process each element

Answer: c
Explanation: Choice c will not process each element correctly due to a syntax error. The length constant is not a method and, therefore, does not have parentheses after it. Choice b is an example of using a *foreach* loop to process an array, and choice a is a correct for loop.

4) Which of the following is a valid declaration for a two-dimensional array?

a) `int[][] matrix;`
b) `int[2] matrix;`
c) `int[]** matrix;`
d) `int[] matrix;`
e) none of these are correct

Answer: a
Explanation: Choice a is the only valid declaration for a two-dimensional array. Choices b and c contain invalid Java syntax, and choice d is a valid declaration for a single dimensional array.

5) Which of the following lines of code accesses the second element of the first array in a two-dimensional array of integers, `numbers`, and stores the result in a variable called `num`?

a) `num = numbers[1][2];`
b) `num = numbers[0][1];`
c) `num = numbers.getElement(1, 2);`
d) `num = numbers.getElement(0, 1);`
e) none of the above are correct

Answer: b
Explanation: Choice b accesses the second element of the first array. Choice a accesses the third element of the second array. Choices c and d do not represent valid Java syntax.

Short Answer/Programming Questions:

1) Write the declaration for an array of doubles called `averages` that is initialized with an initializer list.

Answer:

```
double[] averages = { 25.2, 36.18, 42.1, 30.5 };
```

2) Write the declaration for a two-dimensional array of integers that can be thought of as a table with three rows and three columns. Assign the value 3 to the cell that is in the second row and the third column.

Answer:

```
int[][] table = new int[3][3];
table[1][2] = 3;
```

3) `Student` is a class that defines data fields and methods for an individual student. Write the declaration of an array named `roster` that can be used to reference 24 `Student` objects.

Answer:

```
Student [] roster = new Student[24];
```

4) Write a method called doubleSize that accepts an integer array as a parameter and returns a reference to a new integer array that is twice as long and contains all of the elements of the first array in the same positions.

Answer:

```
public int[] doubleSize(int[] originalArray)  {
      int[] newArray = new int[originalArray.length*2];

      for(int i = 0; i < originalArray.length; i++)
            newArray[i] = originalArray[i];

      return newArray;
}
```

5) `Circle` is a class that has data and methods related to circles. How many `Circle` objects are created by the following declaration?

```
Circle [] shapes = new Circle[12];
```

Answer: No `Circle` objects are created by the declaration. The array declaration creates references to 12 Circles, but the `Circle` objects must be separately instantiated and assigned to the array members.

6) Write a method that accepts an array of integers as a parameter and returns a reference to an array that contains the even numbers in the array original array. The returned array should have a size equal to the number of even numbers in the original array.

Answer:

```
public int[] getEvenArray(int[] numbers)  {
      int size = 0;

      for(int i = 0; i < numbers.length; i++)
            if(numbers[i]%2 == 0)
                  size++;
```

```
        int[] evenArray = new int[size];

        int evenArrayIndex = 0;

        for(int i = 0; i < numbers.length; i++)  {
              if(numbers[i]%2 == 0)  {
                    evenArray[evenArrayIndex] = numbers[i];
                    evenArrayIndex++;
              }//end if
        }//end for
}
```

7) Write a line of code that initializes a two-dimensional array of integers using an initializer list.

Answer:

```
int[][] numbers = { {2,3},{4,5} };
```