Array Methods & For Each Loop

For each of the following questions, write the appropriate code in your notebook (you will need to have this exercise in your notebook to receive full credit during notebook checks). Using your array whiteboard (or the print outs given to you), construct a model of the object constructed by Java.

**To get full credit on this assignment, you must record your answers in your notebook *and* construct models of the arrays using the whiteboard or papers given to you. Your instructor will be checking to make sure you are able to model array construction using the modeling materials provided to you.**

Exercise 1. Arrays and Methods

Methods can alter arrays that are passed to them as parameters. In your notebook and with your modeling supplies, illustrate which elements the array contains after the following code is executed.

*Problem 1a.*

What does the following program output?

public class MyMoney{

public static void doubleMyMoney(int[]m){

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

m[i]\*= 2;

}

}

public static void main(String [] args){

int[]money = {7, 3, 1100, 49};

doubleMyMoney(money);

for(int x : money){

System.out.println(x);

}

}

}

*Problem 1b.*

Let’s get tricky with arrays! What elements does the array numbers contain after the following code is executed?

int[] numbers = new int[8];

numbers[1] = 4;

numbers[2] = 99;

numbers[3] = 2;

int x = numbers[1];

numbers[x] = 44;

numbers[numbers[7]] = 11; //uses numbers[7] as an index

*Problem 1c.*

What elements does the array data contain after the following code is executed?

int[] data = new int[8];

data[0] = 3;

data[7] = -18;

data[4] = 5;

data[1] = data[0];

int x = data[4];

data[4] = 6;

data[x] = data[0] \* data[1];

*Problem 1d.*

Whenever you want to examine each value in an array, you can use a for-each loop. You should ONLY use a for-each loop when you want to examine a value in the array. If you want to access the array to change values in each element, a for-each loop will not work. The structure of a for-each loop looks like this:

for (<type> <name> : <array>){

<statement>;

<statement>;

…

}

Use a for-each loop to write a piece of code that examines an array of integers and reports the maximum value in the array. Consider putting your code into a method called *max* that accepts the array as a parameter and returns the maximum value. Assume that the array contains at least one element.

*Problem 1e.*

Write a method called *average* that computes the average of all elements in an array of integers and returns the answer as a double. For example, if the array passed contains the values [10, -2, 4, -4, 9, -5, 19, -7, -39, -1], the calculated average should be -1.6. Your method accepts an array of integers as its parameter and returns the average.

Exercise 2

*Don’t forget to use your modeling supplies to predict the output of your code at each step—writing code in your notebook is only ½ of the assignment!*

Problem 2a.

Write code that doubles the length of the array *numbers* (from Problem 1a).

Problem 2b.

Write code that copies the *numbers* array from index 0 – 3.

Problem 2c.

Generate code that sets every element in *numbers* to 42.

Exercise 3

Write a method called *range* that returns the range of values in an array of integers. The range is defined as 1 more than the difference between the maximum and minimum values in the array. For example, if an array called *list* contains the values [36, 12, 25, 19. 46. 31. 22], the call of range(list) should return 35 based on the calculation (46 – 12 + 1). You should assume that the array has at least one element.

Exercise 4

Write a method called *mode* that returns the most frequently occurring element of an array of integers. Assume the array has at least one element and that every element in the array has a value between 0 and 100 (inclusive). Break ties by choosing the lower value. For example, if the array passed contains the values [27, 15, 11, 15, and 27], your method should return 15.

*Hint: You may wish to look at the Tally program in your textbook (Chapter 7) to get an idea how to solve this problem.*

Extra Credit: Write a version of this method that does not rely on the values being between 0 and 100.