**Array Lab**

The AP CS exam will have questions that challenge your ability to mentally track what is happening inside loops, often iterating over arrays. These problems will serve as a review of these concepts. If you need to review the syntax for loops and/or arrays, information can be found on Canvas under “1st Year Computer Science Topics” (at the top).

**Create a new project called “ArrayLab”.**

1. Create a Runner class with a public static void main(String[] args) method, where you will test all of your code. Next, create a ArrayLabProbs class that will contain all the exercises (methods) below. Call the methods on a ArrayLabProbs object in Runner to test them.
2. Complete the method public void triangle(int n), that prints the following pattern (nested for loops will be very helpful):

1

22

333

4444

55555

666666

7777777 //n = 7

//This method has a *void* return type! You can't print what it returns, just call it!

1. Complete the method public int lastIndexOf(int[] nums, int value), that returns the **last** index where the valueparameter occurs. The method should return -1 if value can't be found. Traversing the array in reverse would be wise.

lastIndexOf(new int[] {8, 2, 4, 6, 8}, 8) >>> 4

lastIndexOf(new int[] {2, 4, 6, 12}, 8) >>> -1

1. Complete the method public int range(int[] nums), that will return the "range" of the values in the array. The range is defined as the difference between the smallest and largest elements in the array. This must be done without sorting the array.

range(new int[] {8, 3, 5, 7, 2, 4}) >>> 6

range(new int[] {15, 22, 8, 19, 31}) >>> 23

range(new int[] {100, 5}) >>> 95

1. Complete the method public int minDifference(int[] nums) that returns the minimum difference between two *neighboring* numbers in an array.

minDifference(new int[] {4, 8, 6, 1, 5, 9, 4}) >>> 2 //between 8 and 6

1. Complete the method public int priceIsRight(int[] bids, int price), that (similar to the famous game show) returns the element in bids that is closest to price ***without going over***. If all elements in bids are larger than price, your method should return -1.

priceIsRight(new int[] {900, 885, 990, 1}, 800) >>> 1

priceIsRight(new int[] {1500, 1600, 2000, 2500}, 1900) >>> 1600

priceIsRight(new int[] {2000, 3000, 4000, 5000}, 1500) >>> -1

1. Complete the method public int[] productExceptSelf(int[] nums), that will return a new array result such that result[i] is equal to the product of all the elements in nums **except** nums[i].

productExceptSelf(new int[] {1, 2, 3, 4}) >>> {24, 12, 8, 6}

1. **(Riddle) You have two buckets. One holds exactly five gallons and the other three gallons. How can you measure exactly four gallons of water into the five-gallon bucket? Assume you have an unlimited supply of water and that there are no measurement markings of any kind on the buckets.**