Problem 4 requires importing commons lang 2.6.

For this problem, I created 2 additional arrays to store values that we find to be local minimas and local maximas. Then, we will have the linear scan search through the entire array, see if the values are local minima or maxima. This is done by a for loop that will go through every value of the array. Using an if-statement, we can copy the element into its respective array. If they are, we use the ArrayUtils.add function from the imported library to add the values to the 2 separated arrays that store the local minima and maxima.

```
package com.pm2.four;


import java.util.Arrays;

import org.apache.commons.lang.ArrayUtils;

public class Problem4 {

	public int[] minimaArray = null;
	public int[] maximaArray = null;

	public int[] getMinimaArray() {
		return minimaArray;
	}

	public void setMinimaArray(int[] minimaArray) {
		this.minimaArray = minimaArray;
	}

	public int[] getMaximaArray() {
		return maximaArray;
	}

	public void setMaximaArray(int[] maximaArray) {
		this.maximaArray = maximaArray;
	}

	public int Problem4A(int arr[], int arraySize) {

		int count = 0;

		int[] minArr = {};
		int[] maxArr = {};
		arraySize = arr.length;

		// linear Scan Search
		for (int i = 1; i < arraySize - 1; i++) {

			// find the maxima
			if (arr[i] > arr[i - 1] && arr[i] > arr[i + 1]) {
				maxArr = ArrayUtils.add(maxArr, arr[i]);
				count += 1;
			}
```

```
                // find the minima
                if (arr[i] <= arr[i - 1] && arr[i] <= arr[i + 1]) {
                        minArr = ArrayUtils.add(minArr, arr[i]);
                        count += 1;
                }
        }

        this.setMaximaArray(maxArr);
        this.setMinimaArray(minArr);
        System.out.println("Initial array: " ");

        printArray(arr);
        System.out.println("Number of local maxima/minima: ");
        return count;}

    public static void printArray(int[] arr) {
        System.out.print("[");
        for (int i = 0; i < arr.length; i++) {
                if (i == arr.length - 1)
                        System.out.print(arr[i]);
                else
                        System.out.print(arr[i] + ", ");
        }
        System.out.print("]");
    }

}
```

The code is O(log(n)) complex (linear) because it's just going through every value of the array, and comparing to the value left and right, and copying it into the local maxima and local minima arrays respectively.