public class SampleFinalq1 {
    public static void main(String[] args) {
        double x=4, y=2, z=3, t=1;

        x = mystery(y,z);
        System.out.println("1: x = " + x);

        x = mystery(y,mystery(z,t));
        System.out.println("2: x = " + x);

        x = Math.pow(mystery(2,2),2);
        System.out.println("3: x = " + x);

        x = Math.sqrt(mystery(y+1,z+t-1));
        System.out.println("4: x = " + x);

        x = mystery(1+2,2+3);
        System.out.println("5: x = " + x);

        x = mystery(2,3)+mystery(4,2);
        System.out.println("6: x = " + x);

        x = mystery(4,mystery(3,2));
        System.out.println("7: x = " + x);

        x = mystery(mystery(2,3),mystery(3,4));
        System.out.println("8: x = " + x);
    }
    public static double mystery(double x, double y) {
        if (x<y)
            return(y+1);
        else
            return(x+1);
    }
}
2. What is printed by the following program? Show all your work for partial credit.

```java
public class SampleFinalq2 {
    public static void main(String[] args) {
        for (int i = 1; i < 8; i += 2) {
            for (int j = 0; j < 7 - i / 2; j++)
                System.out.print("+");
            for (int j = 0; j < i; j++)
                System.out.print("*");
            System.out.print("\n");
        }
        for (int i = 5; i > 0; i -= 2) {
            for (int j = 0; j < 7 - i / 2; j++)
                System.out.print("+");
            for (int j = 0; j < i; j++)
                System.out.print("*");
            System.out.print("\n");
        }
    }
}
```
3. What is printed by the following program? Show all your work for partial credit.

```java
public class SampleFinalq3 {
    public static void main(String[] args) {
        String mystery = "abcabcabcabc";
        System.out.println(mystery.indexOf("cab"));
        System.out.println(mystery.lastIndexOf("cab"));
        System.out.println(mystery.substring(2, 5));
        System.out.println(mystery == "ABCABCABCABC".toLowerCase());
        System.out.println(mystery.equals("ABCABCABCABC".toLowerCase()));
    }
}
```
4. What does the following program print out? Mark your answer clearly.

```java
import java.util.*;
public class SampleFinalq4 {
    public static void main(String[] args) {
        int[] numbers = {1,0,0,0,0};
        int[] data = {1,1,1,1,1};

        mystery(numbers, 1);
        System.out.println(Arrays.toString(numbers));

        mystery(data, 2);
        System.out.println(Arrays.toString(data));
    }

    public static void mystery(int[] a, int k) {
        for (int i=k; i<a.length; i++) {
            a[i] = a[i-k] + 1;
        }
    }
}
```
5. Complete the following program so that it computes the minimum number and how many times the minimum appears in the array. Note that it places random numbers in the array. You can add additional variables to the program. If the random numbers are \{1, 7, 2, 5, 9, 4, 3, 2, 1, 6\} then minimum is 1 and it appears in the array 2 times. You can do the computation in 2 stages. First, find the minimum and then find how many times it appears in the array.

```java
import java.util.*;
public class SampleFinalq5 {
    public static void main(String[] args) {
        Random randobj = new Random();

        int[] numbers = new int[10];
        int i, min=0, count=0;

        for (i=0; i<numbers.length; i++) {
            numbers[i] = 1 + randobj.nextInt(10);
        }

        System.out.println("Minimum is "+min);
        System.out.println("It appers "+count+" times in the array");
    }
}
```
6. What is printed by the following program? Show all your work for partial credit.

```java
public class SampleFinalq6 {
    public static void main(String[] args) {
        String mystery = "ABCDEFGHIabcdefghij";
        System.out.println(mystery.indexOf("ij"));
        System.out.println(mystery.lastIndexOf("IJ"));
        System.out.println(mystery.substring(3, 6));
        System.out.println(mystery.length());
        System.out.println(mystery.toUpperCase());
        System.out.println(mystery.equals(mystery.toLowerCase()));
        System.out.println(mystery.equalsIgnoreCase(mystery.toLowerCase()));
    }
}
```
7. Write a method called span that takes an array of integers as a parameter and returns the span of the array. The span of an array is the difference between the largest and the smallest elements in the array. For the array \( \{1, 7, 2, 5, 9, 4, 3, 2, 1, 6\} \), span is 8 since largest number is 9 and smallest is 1.
8. Consider an array of Strings and write a method that returns the longest String in the array. For the array, \{"apple","banana","orange","strawberry","blueberry"\}, it should return "strawberry" since it is the longest with length 10.
9. Write a method that returns true if the integer parameter is a power of 2 (1, 2, 4, 8, 16 etc) and false otherwise.
10. Write a program to find the smallest number that is divisible by 2, 3, 4 and 5.
11. Given a String that represents an integer (for example, "1234"), write a method that converts it into an integer (1234) and returns it.
12. Given an array, write a method that returns true if the array is sorted in increasing order and false otherwise. For the array \( \{1, 7, 2, 5, 9, 4, 3, 2, 1, 6\} \), it should return false since it is not sorted and for the array \( \{1, 1, 2, 2, 3, 4, 5, 6, 7, 9\} \), it should return true.