Exercise 3 – Bubble Sort and Arrays

1. Create the following array called *marks* for the following questions

66	78	74	1001	40	79	88	90	33	68

   a. Write a program that will sort and then output the marks from largest to smallest.

```
int [] marks = {66,78,74,1001,40,79,88,90,33,68};
int temp = 0;
boolean fixed = false;
while (fixed==false) {
	fixed=true;
	for (int x=0; x<marks.length-1; x++){
		if (marks[x]<marks[x+1]) {
		temp = marks[x];
		marks[x] = marks[x+1];
		marks[x+1]=temp;
		fixed=false;
		}
	}
}
for (int x=0; x<marks.length; x++) {
	System.out.println(marks[x]);
}

}
```

   b. From the program in part b,
      i. output the largest and the smallest mark.

```
int [] marks = {66,78,74,1001,40,79,88,90,33,68};
int largest = marks[1];
for (int x=0; x<marks.length; x++) {
	if (marks[x]>largest)
		largest = marks[x];
	}
System.out.println("The largest mark is " + largest);
int smallest =marks[1];
for(int x=0; x<marks.length; x++)
	if (marks[x]<smallest) {
		smallest=marks[x];
	}
System.out.println("The smallest mark is " + smallest);
```

      ii. Output the mean average.

```
int [] marks = {66,78,74,1001,40,79,88,90,33,68};
double sum=0;
for (int x=0; x<marks.length; x++) {
```

```
        sum=sum+marks[x];
}
double average = sum/marks.length;
System.out.println("The mean average is " + average);
```

c. Write a program that will arrange and then output the marks from smallest to largest.

```
int [] marks = {66,78,74,1001,40,79,88,90,33,68};
int temp = 0;
boolean fixed = false;
while (fixed == false) {
        fixed=true;
        for (int x=0; x<marks.length-1; x++) {
                if (marks[x]>marks[x+1]) {
                temp = marks[x];
                marks[x] = marks[x+1];
                marks[x+1] = temp;
                fixed = false;
                }
        }
}
for (int x=0; x<marks.length; x++) {
        System.out.println(marks[x]);
}

}
```

i. Starting with the second index, output the difference between the current number and the previous number on the list.

```
int [] marks = {66,78,74,1001,40,79,88,90,33,68};
int difference=0;
for (int x=0; x<marks.length;x=x+2) {
        difference = marks[x+1]-marks[x];
        System.out.println("The difference between " + marks[x+1] + " and " +
        marks[x] + " is " + difference);
```

2. Write a program that will prompt the user for the number of students taking ICS3U0. The program will then prompt the user for the marks of all students taking ICS3U0 out of 100 (do not accept any marks less than 0 or greater than 100).
    a. This program will then sort the marks in numerical order from lowest to largest.
    b. The program will output the median.
    c. The program will output the mode.
    d. Starting with the first element, the program will output the greatest difference between any two numbers

```
        Scanner input = new Scanner(System.in);
        System.out.println("Enter number of students taking ICS3U0:");
        int student = input.nextInt();
        int [] mark = new int [student];
```

```
		for (int x=0; x<mark.length; x++) {
			System.out.println("Enter marks of student " + (x+1) + "
taking ICS3U0 out of 100 ");
			mark [x] = input.nextInt();
			while ((mark[x]<0) || (mark[x]>100)) {
				System.out.println("Invalid mark");
				System.out.println("Enter marks of student " + (x+1)
+ " taking ICS3U0 out of 100 ");
				mark [x] = input.nextInt();
			}
		}
		int temp=0;
		for (int x=0; x<mark.length-1; x++) {
			if (mark[x]>mark[x+1]) {
				temp = mark[1];
				mark[1] = mark[x+1];
				mark[x+1]= mark[x];
				}
		}
		int median = 0;
		if (mark.length%2==0) {
			median = ((mark.length/2) + ((mark.length/2)+1)/2);
			System.out.println("The median is " + mark[median-1]);
		}
		else if (mark.length%2==1) {
			median = ((mark.length+1)/2);
			System.out.println("The median is " + mark[median-1]);
		}
		int mode=0;
		for (int x=0; x<mark.length; x++) {
			for (int z=x+1; z<mark.length-1; z++) {
				if (mark[x]==mark[z]) {
					mode = mark[x];
				}
			}
		}
		System.out.println("The mode is " + mode);
		int largest = mark[1];
		for (int x=0; x<mark.length; x++) {
			if (mark[x]>largest){
				largest=mark[x];
			}
		}

		int smallest = mark[1];
		for (int x=0; x<mark.length;x++) {
			if (mark[x]<smallest){
				smallest = mark[x];
			}
		}
		int difference = largest-smallest;
		System.out.println("The greatest difference between two numbers
is " + difference);
```

3. Create an array of 2000 Strings called *music* and initialize all elements to “0”. This array will hold a song list. Write a program that will prompt the user to enter 2000 songs. This program will then give the user three options. 1: to sort the songs alphabetically (A-Z); 2: to sort the songs alphabetically in reverse (Z-A); and 3: return to the original order (you may need to create more than 1 array to make this happen).
    a. From a user standpoint, how would you improve this program?