Programs for this lab should be stored in your Eclipse repository. Remember to use a location on your P: drive or a USB drive (not the C: drive). Create a new Java project in your workspace called ***lab8***. When your programs are running correctly, **turn in a printout** of the Java code and **send an email** containing your .java files for each program in lab8 (as separate file attachments) to the instructor at stlauterburg@salisbury.edu with the subject line "COSC 117 Lab 8".

Problem 1

A palindrome is a word or phrase that is the same backwards as it is forwards. For example, "A Toyota", "Able was I ere I saw Elba", "Step on no pets" or "Never odd or even" are all palindromes. Note that we **ignore** *spaces* and *case differences* in a phrase when determining whether or not it is a palindrome.

Write a program called Palindrome that does the following:

1. Read in an entire line from the keyboard as a String
2. Remove the spaces
3. Reverse the string
4. Compare the resulting reversed string to the version with its spaces removed in order to determine if the phrase is a palindrome.
5. Print out that the phrase *is* or *is NOT* a palindrome.

Example 1:

```
Please enter a sentence:
Able was I ere I saw Elba

The sentence is a palindrome!
```

Example 2:

```
Please enter a sentence:
Mary had a little lamb

The sentence is NOT a palindrome.
```

Example 3:

```
Please enter a sentence:
A Toyota

The sentence is a palindrome!
```

Problem 2

Take time to review the following program carefully. Make sure you understand how arrays are created and passed as method arguments.

```
import java.util.Scanner;
public class Grades {
	public static void main(String[] args) {
		// the array is created in the readGrades method and returned
		double[] grades = readGrades();
		System.out.printf("\nThe average is %.2f%n", average(grades));
		print(grades); // method call that passes an array argument
	}

	private static double[] readGrades() {
		Scanner keyboard = new Scanner(System.in);
		System.out.print("Enter the number of grades: ");
		int numGrades = keyboard.nextInt();
		double[] grades = new double[numGrades];
		System.out.println("Please enter " + grades.length + " grades...");
		for (int i = 0; i < grades.length; i++) {
			System.out.print("Enter grade #" + (i + 1) + " of " +
				grades.length + ": ");
			grades[i] = keyboard.nextDouble();
		}
		return grades;
	}

	private static double average(double[] numbers) {
		double sum = 0.0;
		for (int i = 0; i < numbers.length; i++) {
			sum = sum + numbers[i];
		}
		return sum / numbers.length;
	}

	private static void print(double[] numbers) {
		for (int i = 0; i < numbers.length; i++) {
			System.out.println("Grade #" + (i + 1) + ": " + numbers[i]);
		}
	}
}
```

Sample run of Grades

```
Enter the number of grades: 3
Please enter 3 grades...
Enter grade #1 of 3: 47.5
Enter grade #2 of 3: 33
Enter grade #3 of 3: 12

The average is 30.83
Grade #1: 47.5
Grade #2: 33.0
Grade #3: 12.0
```

Problem 3

Write a program called Temperatures that will read in a user specified number of temperatures into a double array. Then print the highest, lowest and average temperature. Write **five** separate methods in addition to the `main` method – one each for `readTemps`, `highestTemp`, `lowestTemp`, `averageTemp` and `printTemps`. The `printTemps` method should be a void method (it returns nothing) and should accept a double[ ] as input. The `readTemps` method should create and return a double[ ] and does not take any arguments. The other three should accept a double[ ] as input and return a double value. Make sure you test your program using temperatures bpth above and below zero. Temperatures that you output should be formatted to display 2 places past the decimal point.

Sample run:

```
Enter the number of temperatures: 7
Please enter 7 temperatures...
Enter temperature #1 of 7: 77
Enter temperature #2 of 7: 65
Enter temperature #3 of 7: 69
Enter temperature #4 of 7: 82
Enter temperature #5 of 7: 70
Enter temperature #6 of 7: 57
Enter temperature #7 of 7: 76

The average temperature is 70.86
The highest temperature is 82.00
The lowest temperature is 57.00

The above statistics are based on the following temperatures:
Temperature #1: 77.00
Temperature #2: 65.00
Temperature #3: 69.00
Temperature #4: 82.00
Temperature #5: 70.00
Temperature #6: 57.00
Temperature #7: 76.00
```