# Home Work Assignment 1

**Problem 1:** The diameter of the Sun is approximately 865,000 miles. The diameter of the Earth is approximately 7600 miles. Use the methods in the class Math to calculate,

(a) the volume of the Earth in cubic miles

(b) the volume of the Sun in cubic miles

(c) the ratio of the volume of the Sun to the volume of the Earth

and then output the three values. Treat both the earth and sun as spheres. The volume of a sphere is given by the formula 4 pi r^3/3 where r is the radius.

Run the code you have written, and turn in both your code and the output of the program. The output should say something like: The volume of the Earth is X cubic miles, the volume of the sun is Y cubic miles, and the ratio of the volume of the Sun to the volume of the Earth is Z.

## Code:

MathCalc.java

```java
package problem1;

public class MathCalc {

    public static void main(String[] args) {
        double diameterSun = 865000.0;
        double diameterEarth = 7600.0;
        double radiusSun = 865000.0;
        double radiusEarth = 7600.0;
        double volumeSun = 865000.0;
        double volumeEarth = 7600.0;
        double volumeRatio = 865000.0;


        radiusSun = diameterSun / 2;
        radiusEarth = diameterEarth / 2;

        volumeSun = (4.0 / 3.0) * Math.PI * Math.pow(radiusSun, 3);
        volumeEarth = (4.0 / 3.0) * Math.PI * Math.pow(radiusEarth, 3);

        volumeRatio = volumeSun / volumeEarth;

        System.out.printf("The volume of the Earth is %.2f cubic miles, the volume of the Sun is %.2f cubic miles, "
                + "and the ratio of the volume of the Sun to the volume of the Earth is %.2f.%n"
                , volumeEarth, volumeSun, volumeRatio);
    }

}
```

## Solution:

Problems | Javadoc | Declaration | Console | Terminal | Git Staging

```
<terminated> MathCalc [Java Application] C:\Users\davey\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_23.0.0
The volume of the Earth is 229847296117.04 cubic miles, the volume of the Sun is 338880785199312100.00
cubic miles, and the ratio of the volume of the Sun to the volume of the Earth is 1474373.60.
```

**Problem 2:** Create a new program that has the following features. Download source (JAVA).
(a) Uses labeled continue instead of break.

(b) Does not require the isPrime variable.

(c) When testing whether an integer is prime, it is sufficient to try and divide by integers up to the square root of the number being tested.

## Code:

Primes.java

```java
package problem2;

public class Primes {
    public static void main(String[] args) {
        int nValues = 50;

        outer:
        for (int i = 2; i <= nValues; i++) {
            for (int j = 2; j * j <= i; j++) {
                if (i % j == 0) {
                    continue outer;
                }
            }

            System.out.println(i);
        }
    }
}
```

## Solution:

```
<terminated> Primes [Java Application] C:\Users\davey\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.
2
3
5
7
11
13
17
19
23
29
31
37
41
43
47
```

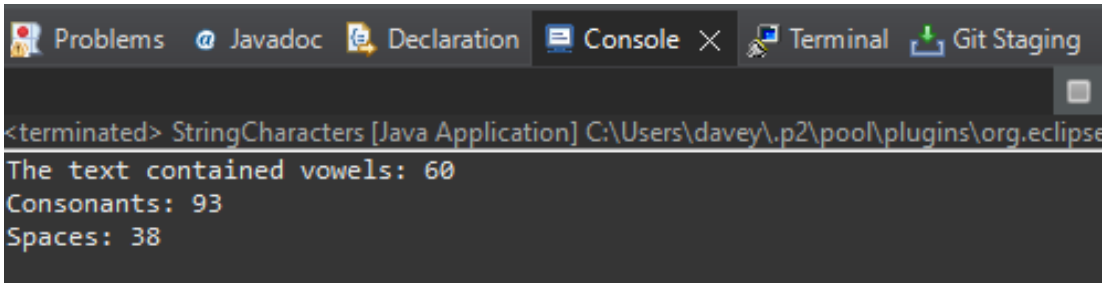
**Problem 3:** In the following code the soliloquy is analyzed character by character to determine the vowels, spaces and letters used. Fill in the code that computes the number of spaces, vowels, and consonants. Download source (JAVA).

## Code:

StringCharacters.java

```java
package problem3;

public class StringCharacters {
    public static void main(String[] args) {
        String text = "To be or not to be, that is the question;"
                + " Whether `tis nobler in the mind to suffer"
                + " the slings and arrows of outrageous fortune,"
                + " or to take arms against a sea of troubles,"
                + " and by opposing end them?";

        int spaces = 0,
        vowels = 0,
        letters = 0;

        for (char ch : text.toCharArray()) {
            if (Character.isLetter(ch)) {
                letters++;
                ch = Character.toLowerCase(ch);
                if ("aeiou".indexOf(ch) != -1) {
                    vowels++;
                }
            } else if (Character.isWhitespace(ch)) {
                spaces++;
            }
        }

        System.out.println("The text contained vowels: " + vowels + "\n"
                + "Consonants: " + (letters - vowels) + "\n"
                + "Spaces: " + spaces);
    }
}
```

## Solution:

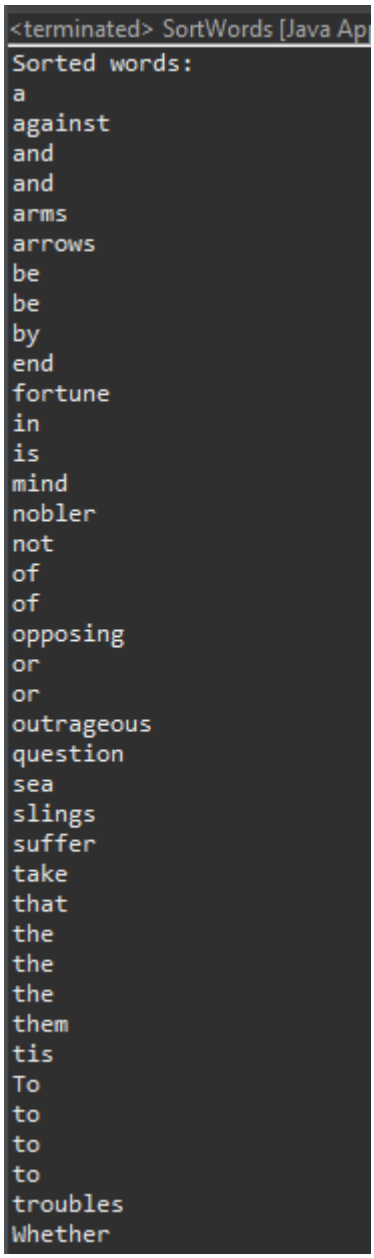


**Problem 4:** Write a program that sets up a String variable with the soliloquy in the previous question, extracts the words from the text and sorts them into alphabetical order.

## Code:

```java
package problem4;

public class SortWords {
    public static void main(String[] args) {
        String text = "To be or not to be, that is the question;"
                + " Whether `tis nobler in the mind to suffer"
                + " the slings and arrows of outrageous fortune,"
                + " or to take arms against a sea of troubles,"
                + " and by opposing end them?";

        String[] words = text.split("[\\s,;?.`]+");
        bubbleSort(words);

        System.out.println("Sorted words:");
        for (String word : words) {
            System.out.println(word);
        }
    }

    // Bubble sort method
    public static void bubbleSort(String[] array) {
        int n = array.length;
        boolean swapped;
        do {
            swapped = false;
            for (int i = 0; i < n - 1; i++) {
                if (array[i].compareToIgnoreCase(array[i + 1]) > 0) {
                    String temp = array[i];
                    array[i] = array[i + 1];
                    array[i + 1] = temp;
                    swapped = true;
                }
            }
            n--;
        } while (swapped);
    }
}
```

## Solution:


<terminated> SortWords [Java Ap
Sorted words:
a
against
and
and
arms
arrows
be
be
by
end
fortune
in
is
mind
nobler
not
of
of
opposing
or
or
outrageous
question
sea
slings
suffer
take
that
the
the
the
them
tis
To
to
to
to
troubles
Whether