Week 2

Exercise 1.2.25

Wind chill. Given the temperature T (in degrees Fahrenheit) and the wind speed v (in miles per hour), the National Weather Service defines the effective temperature (the wind chill) as follows:

$w = 35.74 + 0.6215T + (0.4275T - 35.75)v^{0.16}$

Write a program that takes two double command-line arguments temperature and velocity and prints the wind chill. Use `Math.pow(a, b)` to compute a^b. Note: The formula is not valid if T is larger than 50 in absolute value or if v is larger than 120 or less than 3 (you may assume that the values you get are in that range).

```
class WindChill {
  public static void main(String[] args) {
    if (args.length < 2) {
      System.err.println("Usage: [temperature] [velocity]");
      return;
    }
    var temperature = Double.parseDouble(args[0]);
    var velocity = Double.parseDouble(args[1]);
    if (Math.abs(temperature) > 50. || velocity > 120. || velocity < 3.) {
      System.err.println("Values outside of allowed range.");
      return;
    }
    var wind_chill = WindChill.calculateWindChill(temperature, velocity);
    System.out.printf("The effective temperature is %fF.%n", wind_chill);
  }

  public static double calculateWindChill(double T, double v) {
    return 35.74 + (0.6215 * T) + (0.4275 * T - 35.75) * Math.pow(v, 0.16);
  }
}
```

Listing 1: WindChill

Exercise 1.2.30

Uniform random numbers. Write a program that prints five uniform random numbers between 0 and 1, their average value, and their minimum and maximum values. Use `Math.random()`, `Math.min()`, and `Math.max()`.

```
import java.util.ArrayList;

class RandomValues {
  public static void main(String[] args) {
    var numbers = new ArrayList<Double>(5);
    for (var i = 0; i < 5; i++)
      numbers.add(Math.random());
    var min = 1.;
    var max = 0.;
    var sum = 0.;
    for (var num : numbers) {
      min = Math.min(num, min);
      max = Math.max(num, max);
      sum += num;
    }

    var avg = sum / numbers.size();

    for (var num : numbers) {
      System.out.printf("%f ", num);
    }
    System.out.println();
    System.out.printf("Average: %f, Minimum: %f, Maximum: %f%n", avg, min, max);
  }
}
```

Listing 2: RandomValues