CS146 Homework 1

Problem 1. *(Windchill.java)* Given the temperature *t* (in Fahrenheit) and the wind speed *v* (in miles per hour)

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

Write a program WindChill.java that takes two doubles *t* and *v* as command-line arguments and writes the wind chill.

```
$java Windcill 32 15


21.588988890532022
```

Problem 2. *(Power.java)* Implement the static method power() that takes two integer arguments a and b and returns the value of a_b, computed recursively using the recurrence relation

$$a^b = \begin{cases} 1 & \text{if } b = 0, \\ aa^{b-1} & \text{if } b \text{ is odd,} \\ (a^2)^{b/2} & \text{if } b \text{ is even.} \end{cases}$$

```
$ java Power 3 5
243
```

Problem 3. *(ThreeSort.java)* Write a program ThreeSort.java that takes three integers as command-line arguments and writes them in ascending order, separated by spaces. Use Math.min() and Math.max().

```
$ java ThreeSort 1 2 3
1 2 3
$ java ThreeSort 1 3 2
1 2 3
$ java ThreeSort 2 1 3
1 2 3
$ java ThreeSort 2 3 1
1 2 3
```

Problem 4. *(ThreeDice.java)* Write a program ThreeDice.java that writes the sum of three random integers between 1 and 6, such as you might get when rolling three dice.

```
$ java ThreeDice

4
```

Problem 5. *(Student.java)* Print the first name, last name, and an id in special sorted formats: (1-unsorted, 2-sorted alphabetically by first name, 3-and sorted by id number). The array was already created for objects of type Student for name, and some number in Student.java. Your part is to do the following:

1. Fill all the empty functions
2. Change variable id to final

```
$ java Student
Unsorted: Samy Tolaymat 2
Unsorted: Linxin Liu 6
Unsorted: Jung S. Kim 9
Unsorted: Kimberly N. Le 1
Unsorted: Robert A. Gonzalez 8
Unsorted: Sarah R. Roscoe 4

Sorted by fisrt name: Jung S. Kim 9
Sorted by fisrt name: Kimberly N. Le 1
Sorted by fisrt name: Linxin Liu 6
Sorted by fisrt name: Robert A. Gonzalez 8
Sorted by fisrt name: Samy Tolaymat 2
Sorted by fisrt name: Sarah R. Roscoe 4

Sorted by id: Kimberly N. Le 1
Sorted by id: Samy Tolaymat 2
Sorted by id: Sarah R. Roscoe 4
Sorted by id: Linxin Liu 6
Sorted by id: Robert A. Gonzalez 8
Sorted by id: Jung S. Kim 9
```

Problem 6. *(Distance.java)* Implement the static method distance() that takes position vectors x and y— each represented as a *1D* array of doubles — as arguments and returns the Manhattan distance between them, calculated as $|x_1 – y_1| + |x_2 - y_2|$

```
$ java Distance
6
-9 1 10 4 6 -3
6
-2 3 9 11 -5 0
31.0
```

Submitting Information:

- Use the code I provided for each problem. DON'T DELETE ANY FUNCTION
- You should have each problem in a separate java file:
    - Windchill.java
    - Power.java
    - ThreeSort.java
    - ThreeDice.java
    - Student.java
    - Distance.java
- Submit your work on Canvas as a .zip file.
- Submit only .java files. Do not submit .class files
- The deadline is Thursday, Sep 3rd at 5:59PM

Note: If the compilation or the running fail, try `javac-introcs` or `javac-algs4` for compilation and
`java-introcs` or `java-algs4` for running instead of `javac` and `java`