Assignment 2 (100 points)
CS 113 Spring 2015

Due Date: See Syllabus

Name & UCID & Section Number: Please write your name, UCID, and section number on the submission – please staple sheets together – no loose sheets (**5 points**)

What is to be handed in:

1. Problem 1: This assignment sheet with the answers written on it
2. Problem 2: Program listing with the program output using the inputs given.

1. Exercises (Total 20 points)

a. (5 points) What is the value contained in the integer variable `size` after the following statements are executed in sequence rather than as individual statements?

```
size = 18;
size = size+12;
size++;
size = size*4;
size = size / 4
```

b. (5 points) What is the value contained in integer variable `length` after the following statements are executed:

```
length = 5;
length *= 2;
length *= length;
length /= 100;
```

c. (5 points) Given the assignments

```
x = 3; y = 4; z = 8;
```

what are the values of the expressions

- `x + y * z`

- `(x - y) * z`
- `x + (y * z)`
- `x < y`
- (x < y) || (z != 1)

d. (5 points) The distance between two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$\text{distance} = ((x_2-x_1)^2 + (y_2-y_1)^2)^{1/2}$$

Write a Java assignment statement that that assigns to the variable `distance` the distance between the two points (x_1, y_1) and (x_2, y_2).

Note: The notation $(x)^{1/2}$ specifies the square root which in Java can be computed using the method `Math.sqrt()`.

2. Temperature Conversion Application (75 points)

What is to be done?

Write a Java application (i.e., program with a **main** method) that converts temperatures -- from Fahrenheit (F) to Centigrade (C) and vice versa

What are the formulas for temperature conversion?

Let tC be temperature in Centigrade and tF be temperature in Fahrenheit. Then

$$tC = ((tF-32.0) \times 5.0) \div 9.0$$

or

$$tF = ((tC \times 9.0) \div 5.0) + 32.0$$

What are the inputs that will be given to the program?

The program accepts as inputs a conversion indicator followed by the temperatures to be converted.

1. The first number will be a 0 (indicating F → C conversion) or a 1 or any non-zero value (indicating C → F conversion)
2. a list of temperatures to be converted, one at a time, terminated by Ctrl-Z (Ctrl-D)

How about some inputs to use?

You should test your program with several different inputs. But you should submit your assignment using the inputs shown below.

1. Here are inputs asking for F → C conversion

```
0
212.0
32.0
45.0
99.0
-459.67
```

   End input by typing Ctrl-Z (or Ctrl-D).

2. Here are inputs asking for C → F conversion

```
1
100.0
0.0
7.22
37.22
-273.17
```

End input by typing Ctrl-Z (or Ctrl-D).

What will the output of the program look like?

For the F → C conversion, here is some sample output produced by running the program in jGRASP:

```
Welcome to the Temperature Converter!
Enter 0 to convert F --> C and 1 to convert from C --> F.
Enter Control-Z when done!
0
Welcome to the F --> C Converter!
212.0
212.00F = 100.00C
32.0
32.00F = 0.00C
45.0
45.00F = 7.22C
99.0
99.00F = 37.22C
-459.67
-459.67F = -273.15C
<eof>
Goodbye!
```

The output for the C → F conversion the output will have a similar format.

Note: To submit the output, copy the output to a text file and print the text file.

How about some hints on writing this program?

1. See how input is read and printed in Assignment 1. You will need to use this.
2. You should comment the program appropriately
3. Your program will have code of the form shown in assignment 1 (import statement, class definition – give it an appropriate name, and the `main` method). The body of the `main` method will be something like the following (but written in Java):

Set up the input stream we called `stdin` (`Scanner` class)
Read the conversion direction input into the integer variable F2C

```
if (F2C == 0) {
```
    Read inputs and do the F → C conversions
```
)
else {
```
    Read inputs and do the C → F conversions
```
}
```
Print goodbye

4. The "Read inputs … " can be written as

```
while(stdin.hasNext()) {
```
    Read the next input value
    Do the conversion
    Print the original and converted values
```
}
```

Grading

The program will be graded as follow for a total of 75 points:

- Appropriate comments: 10 points
- Appropriate indentation: 10 points
- Prints the F → C conversions correctly (using the input shown): 25 points
- Prints the C → F conversions correctly (using the input shown): 25 points
- Nice output: 5 points

Note about jGrasp on Linux

Ctrl-Z (Ctrl-D) do not signal end of input. Instead, to signal end of input, hit the Enter key first. Then right click on the Run I/O panel. You will see an option *Send EOT*. Select this option and hit Enter.