UNBC Laboratory Assignment
Computer Science 100—Fall 2012

Expressions and Static Methods[1]

Purpose:

To practise the use of static methods and `public final static` constants.

Due Date:

The completed lab assignment is due Friday 2011-10-19 *at the beginning of lecture*.

General Goals

The general aim of this laboratory assignment is to *redo* Lab Assignment 2, but using static methods. As such, *You must use methods* (*other than* `public static void main(Strings args[])`) *in order to get credit for the parts of this assignment.*

In future, determining what methods are appropriate for decomposing a problem will be left more and more at your discretion. For this assignment, if particular methods are suggested, please use them (but feel free to add addtional methods as you see fit).

Redoing Converting Celsius to Fahrenheit

The original problem read as follows:

> **Converting Celsius to Fahrenheit**
>
> Temperatures measured in degrees Celsius can be converted to temperatures in degrees Fahrenheit using the formula:
>
> $$F = \frac{9}{5}C + 32. \quad (1)$$
>
> A simpler approximation that works well for near-room temperatures is
>
> $$F = 2C + 30. \quad (2)$$
>
> Write a program that produces output like that shown in Figure 1 on page 3.

[1] Revised slightly 2012-10-15!

Redo this using methods

- `public static double promptForDouble(String prompt) {...}`
- `public static double cToF_exact(double f) {...}`
- `public static double cToF_approx(double f) {...}`

(You may change the names to be more descriptive.)

Recomputing your age in Giga-seconds

The original problem read as follows:

> **Computing your age in Giga-seconds**
> Derive the equations necessary[2], and write a program that asks you for your age in years, and then prints your age in gigaseconds. The input and output should look something like that shown in Figure 2 on the next page.[a]
> Note that if you print your output using a command like
>
> ```
> System.out.println("Your age ("+years+"years) is "
>                                 + ageInGigaSeconds + " Gs.");
> ```
>
> you are likely to get an output that looks like
>
> ```
> Your age (49.9999937 years) is 1.48318364736 Gs.
> ```
>
> To get a nicer format, you need to ....
>
> [a] The output format was changed 2012-10-15!

Use `public static final double` constants

- `SECONDS_PER_YEAR`
- `SECONDS_PER_GIGASECOND`

and methods

- `promptForDouble` from above
- `public static double yearsToGs(double y) {...}`
- `public void displayResult(double years, double gigaSeconds) {...}`

[2] Assume either 365 days in a year, or 365.2442 days in a year. In other words, you *do not* need to calculate exactly when there were leap-years. In JAVA, 10^9 written as a `double` is `1.0E9`. Do not worry about plurals in this problem.

Figure 1: Sample I/O for Celsius to Fahrenheit program.

```
Celsius temperature to convert? 22.0
22.0 C is exactly 71.6 F.
22.0 C is approximately 74.00 F.
```

Figure 2: Sample I/O for GigaSecond program.

```
Your age in years is: 47.
Your age (47.00 years) is 1.48 Gs.
```

Note the change in output format.

```
Total seconds to convert? 7384
7384 seconds is 2 hours 3 minutes and 4 seconds.
```

Figure 3: Sample I/O for Hours, Minutes, Seconds program.

Reconverting seconds into hours minutes and seconds

The original problem read as follows:

> **Converting seconds into hours minutes and seconds**
> There 60 seconds in a minute, and 60 minutes in an hour. Work out equations to convert total seconds into hours, minutes and seconds using integer divide and '%'. Write a program that produces output like that shown in Figure 3 on the preceding page.

Unlike for Laboratory Assignment 2, for this lab it is *not ok* to produce output like "`3661 seconds is 1 hours 1 minutes and 1 seconds.`" You *must* get the plurals correct. Use at least the following methods:

- `public static int promptForInt(String prompt) {...}`
- `public static String withPlural(int number, String noun) {...}`

The method `withPlural` should be designed so that `withPlural(1,"minute")` produces the string "`1 minute`", but `withPlural(2,"second")` produces "`2 seconds`".

What to hand in

⇒ Hand in the redone assignment 2. Be sure to provide a JAVADOC-style comment before each method.

⇒ Script your code, your compilation, and some test runs. Be sure to use `/opt/scriptfix/scriptfix` on script.