CMSC 143: Introduction to Object-Oriented Programming with Robots
Lab 6: Fruitful Functions (Midterm Review)
Due March 11, 2010

Submit a copy of your python program (cmsc143_lab6_NAME.py) on moodle. Your program should have your name, email, and the date at the top of the file as a comment.

Learning Objectives

- Use functions that return values.
- Compose functions
- Write functions that return values.
- Write test cases for your functions.

Battery Capacity

Your robot uses 6 AA batteries. Each AA battery can range between 0–1.5V, so the robot can range between 0–9V. Write a function `batteryLeft()` that returns the battery capacity as a percentage between 0–100. `getBattery()` returns the battery voltage as a floating point between 0.0–9.0.

Temperature

Write six functions that convert between the different temperature scales. Use **only the equations below**, and you should **reuse your functions whenever possible** to limit redundant code. You might want to draw the function black-box diagrams (input/output) before you start programming.

Using the temperature conversion functions write a function `tableTemps()` that prints a table of: absolute zero (-459.67°F), the freezing point of water (32°F) the boiling point of water (212°F) in celsius, kelvin, rankine, and delisle.

```
celsiusToFarenheit(degreesInCelsius)     farenheitToCelsius(degreesinFarenheit)
farenheitToKelvin(degreesInKelvin)       kelvinToFarenheit(degreesInKelvin)
farenheitToRankine(degreesInFarenheit)   farenheitToDelisle(degreesInFarenheit)
```

	from Celsius	to Celsius
Farenheit	$F = C \times \frac{9}{5} + 32$	$C = (F - 32) \times \frac{5}{9}$
Kelvin	$K = C + 273.15$	$C = K - 273.15$

	from Kelvin	to Kelvin
Rankine	$R = K \times \frac{9}{5}$	$K = R \times \frac{5}{9}$

	from Delisle	to Delisle
Rankine	$R = 671.67 - D \times \frac{6}{5}$	$D = (R - 671.67) \times \frac{5}{6}$

Unit tests

Write two functions: `testCelsius(degrees)` that takes a temperature and returns the result of the expression: `celsiustoFarenheit(farenheitToCelsius(x))` and another `testKelvin(degrees)` that takes a temperature and returns the result of the expression: `kelvinToFarenheit(farenheitToKelvin(x))`. What are the results for the following function calls?

```
testKelvin(-10)      testCelsius(2)
testKelvin(83.323)   testCelsius(43.5)
```