AP Computer Science A @ Beijing National Day School

Problem Set 16: `Linear Function`

Due date: Monday, April 15, 2019
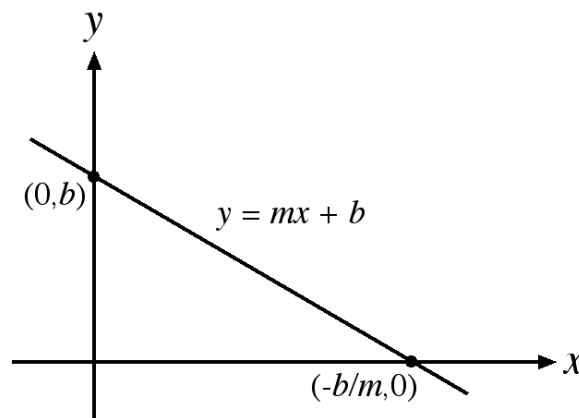*Instructor:* Mr. Alwin Tareen
Total Points: 15

Task Overview

- Place an information box at the beginning of your `Java` program, **which includes your name**. This formally confers your ownership of the code.

- Implement a program that calculates the variables that are associated with the equation of a line in a 2-D plane: $y = mx + b$.

Background

- Consider the graph of the line: $y = mx + b$

- The line has a particular slope, m, and it intersects both the x-axis and the y-axis.

- Given a certain value of x, I should be able to find the corresponding value of y.

- Also, if I am provided with a particular value of y, I should be able to discover the corresponding x value.

Specification

The Information Box Which Includes Your Name [5 points]

- **You are responsible** for typing your own name into the `Author` field, where it says: `YOUR NAME HERE`. Include both your English and Pinyin names.

- If the `Author` field is left blank, or if it contains **someone else's name**, then these 5 points will not be awarded to you.

Calculating the Variables of the Line $y = mx + b$ **[10 points]**

- This problem set invovles the implementation of the `LinearFunctionMethods` interface, which has been provided for you. This interface includes a number of methods that perform calculations regarding the line $y = mx + b$. You are responsible for providing implementations

for all of the methods that are included in that interface. Note that if you leave any of these methods out, your program will not compile.

- Write a `Java` program in the file `LinearFunction.java` that performs the various calculations of the line $y = mx + b$. In order to simplify matters, we will assume that the line can never be completely vertical, or completely horizontal. You may need to perform some simple algebra on the equation $y = mx + b$ to achieve the desired outcome. Write your code in the areas specified by: `YOUR CODE HERE`

- Specifically, you are required to implement the following methods:

  - `public double getSlope()`
    This method returns the slope m.
  - `public double getYintercept()`
    This method returns the y-coordinate of the position where the line crosses the y-axis.
  - `public double getXintercept()`
    This method returns the x-coordinate of the position where the line crosses the x-axis.
  - `public double getYvalue(double x)`
    This method returns the y-value that corresponds to the given x parameter.
  - `public double getXvalue(double y)`
    This method returns the x-value that corresponds to the given y parameter.

Testing

- In order to run the `JUnit` test bench, simply click on the `Run Tests` button. If you are missing this button, then right-click on the module `LinearFunctionJUnitTest` and select `All Tests`. Then, you should see a `BlueJ: Test Results` window appear.

- If your `JUnit` test is successful, you should see a green bar appear. Also, each of the specific testing functions should have a green checkmark in front of them. If your test is unsuccessful, then a red bar will appear, and you will need to correct the errors.

Submission

- Submit your `Java` program by uploading it to the `Web-CAT` automated grading platform. Click on the following link:
  `http://ec2-54-65-207-33.ap-northeast-1.compute.amazonaws.com:8080/Web-CAT/WebObjects/Web-CAT.woa`