Wentworth Institute of Technology
COMP1000 – Computer Science I
Fall 2017, Kreimendahl

Programming Assignment 3

In this assignment you are to write programs to solve the following problems. As with all assignments, remember the following submission steps:

- Make sure your code passes at least all the provided JUnit tests
- Create and test Javadoc code documentation
- Save, commit, and push all code changes
- Confirm the latest code is visible via the "Files" section of your repository website
- Confirm that the repository is private, and that the instructor has Developer access

Not that for each problem, some JUnit tests that will be used for grading have not been provided as a part of the starter code. It is your responsibility to thoroughly test your code.

Problem a (`PA3a.java`)

Write a program to evaluate the area of a triangle given the lengths of its sides using Heron's Formula[1]. Here is an outline:

1. Get the three side lengths from the user (which might have decimal values): a, b, c.
2. Check to ensure that the sides are valid for a triangle. Importantly, the sum of the lengths of any two sides must be larger than the length of the third side (you must check all three sides this way).
3. Calculate the semiperimeter (s):

   $$s = \frac{a+b+c}{2}$$

4. Calculate the area:

   $$area = \sqrt{s(s-a)(s-b)(s-c)}$$

You must format the output to have two decimal places (even if they are both 0), and round if necessary. For example:

```
Enter the length of side a: 3
Enter the length of side b: 4
Enter the length of side c: 5
The area is 6.00
```

You have been supplied JUnit tests for integer and decimal inputs, inputs with a side length that is too long, and inputs with negative side lengths.

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[1] http://en.wikipedia.org/wiki/Heron%27s_formula

Problem b (`PA3b.java`)

Write an astrology program. The user will give their birthday as a month number (1 – 12) and then a day number (1 – 31). Your program will then output the person's astrological sign on one line, and then a horoscope for the user on the next. You may make up whatever horoscope you want for each different sign. Here are the sign dates:

Sign	Start Date	End Date
Aries	March 21	April 19
Taurus	April 20	May 20
Gemini	May 21	June 21
Cancer	June 22	July 22
Leo	July 23	August 22
Virgo	August 23	September 22
Libra	September 23	October 22
Scorpio	October 23	November 21
Sagittarius	November 22	December 21
Capricorn	December 22	January 19
Aquarius	January 20	February 18
Pisces	February 19	March 20

and here is an example execution:

```
Enter your birth month (1-12): 9
Enter your birth day (1-31): 26
You are a Libra!
Tony Stark will buy out your business.
```

You are going to need to use a long set of **`if`** and **`else if`** statements. You will either need to use compound expressions (combining expressions with the "and" and "or" operators) or have nested **`if`** statements (**`if`** statements inside of **`if`** statements).

To get started, try to get one or two of the signs correct first, then try to make it work for the rest. You should verify that the month is between 1 and 12 and the day is between 1 and 31, but you **don't** need to check the day for specific months.

You have been supplied with JUnit tests for each of the signs, as well as day/month inputs that are too large.