AP CSA
Java Math Project

In your Unit 2 notes project in Eclipse add the files Circle.java, PhoneNumber.java, and QuadraticFormula.java from the Google classroom.

Circle.java:

- Type your name, date, and class period into the comments section.
- Compile and run the program to see the output.
- Modify the code to utilize the Math Class methods and constant.
- Declare a new `double` called `circumference`, calculate and store the circumference in that variable each time you compute it, and create two additional `println` statements to output the results of the circumference. Be sure your outputs are complete sentences.
- ***When the radius of a circle doubles, what happens to its circumference and area?*** You can determine this by dividing the second area by the first area. Unfortunately, as it is now the program overwrites the first area with the second area (same for the circumference). You need to save the first area and circumference you compute instead of overwriting them with the second set of computations. So you'll need two area variables and two circumference variables, which means they'll have to have different names (e.g., `area1` and `area2`). Remember that each variable will have to be declared. Modify the program as follows:
  - Change the names of the area and circumference variables so that they are different in the first and second calculations. Be sure that you print out whatever you just computed.
  - At the end of the program, compute the area change by dividing the second area by the first area. This gives you the factor by which the area grew. Store this value in an appropriately named variable (which you will have to declare).
  - Add a `println` statement to output the change in area that you just computed.
  - Now repeat the last two steps for the circumference.
- In the modifications above, you showed what happened to the circumference and area of a circle when the radius went from 10 to 20. Does the same thing happen whenever the radius doubles? To figure this out, you can modify the program to randomly create values instead of having it written into the program ("hardcoded"). Modify your program as follows.
  - Instead of initializing the radius in the declaration with the number 10, utilize the `Math.random()` method to create an integer value in the range [1,100]□
  - Assign the second radius value as a calculation for twice the value of the first radius.
  - Compile and run your program. Do your results from above still hold?

PhoneNumber.java:

- Type your name, date, and class period into the comments section.
- Create a random phone number and output it in the format (XXX) XXX – XXXX
- Utilize a separate `Math.random()` method to create each of the three segments of a phone number. The area code, exchange code, and last four digits of the phone number.
  - Be sure that the area code and exchange code do not begin with a 0 or 1.
  - The last four digits are any number in the set [0000 to 9999].
  - Only calculate 3 random numbers, not ten.
- Output the phone number. (WARNING: There is a built in logic error that we will correct later)

QuadraticFormula.java:

- Type your name, date, and class period into the comments section.
- Utilize the methods of the Math class to compute and output the solution(s) to a quadratic equation in the form $ax^2 + bx + c = 0$.
- Since we have not covered `if…else` statements it is ok to assume that all quadratic equations will have two answers and `NaN` is an acceptable answer for imaginary solutions. This will be updated at a later date.
- Utilize `print` and `println` statements to output the equations and solutions.
  - Sample Outputs:

```
The solutions to 1x^2-6x+9=0 are 3.0 and 3.0
The solutions to 1x^2+1x+1=0 are NaN and NaN
The solutions to 1x^2+4x+3=0 are -3.0 and -1.0
```

- Hardcode different values to the variables a, b, and c to ensure that it works appropriately, but complete your program by using `Math.random()` to assign a random integer to each variable in the range of [-25, 25]

When completed: Create a folder with your LastnameFirstname. Put all three (3) completed .java files into the folder. Compress (zip) the folder and submit through Google Classroom.

*****Time Frame*****
4 Class Periods

*****Points*****
Circle.java – 10 points
PhoneNumber.java – 5points
QuadraticFormula.java – 10points

*****Deductions*****
No Name – loss of 5points per program
Compile Errors – 5points each
Logic Errors – 2points each
Days Late – 2points per day per late program