**Java Midterm – Variant 3 (Good luck!)**

*Please create a* ***zip archive*** *of all answers, name it with your* ***UG code*** *and upload it to this link* <https://mega.nz/megadrop/lZCGIsIZS5M>

**True/False questions (1 points each)**

1. The name of the class in Java can be different from the filename.
2. Java can find out the type of a variable by itself.
3. Whenever the "==" operator is used, for example **exp1 == exp2**
where *exp1* and *exp2* are boolean expressions, sometimes *exp2* is not evaluated.
4. The "switch" selection structure must end with the default case.
5. Variables declared inside a while loop are limited in scope to the loop.
6. An array in the Java programming language has the ability to store many different types of values.
7. Two methods in Java can have the same name.
8. Every class we create in Java is actually a sub-class.

**Code Tasks**$ $**(2 points each)**

1. Implement a average() function that will take in two integers, three integers or an array of integers, and return the average value.
2. Write a program that generates 50 random integers between 100 and 500 and print the maximum and minimum values from the generated numbers.
3. We are having a party with amounts of tea and candy. Write a method “partyResult” and return the int outcome of the party encoded as 0=bad, 1=good, or 2=great. A party is good (1) if both tea and candy are at least 5. However, if either tea or candy is at least double the amount of the other one, the party is great (2). However, in all cases, if either tea or candy is less than 5, the party is always bad (0).
4. Given a string, compute recursively (no loops) the number of lowercase 'a' chars in the string.

Examples:
countX("aahiaa") → 4
countX("ahiahia") → 3
countX("hi") → 0

1. Create an abstract class 'Bank' with an abstract method 'getBalance'. 'BankA', 'BankB' and 'BankC' are subclasses of class 'Bank', each having a method named 'getBalance'. In BankA, the balance is $100, in BankB - $200, in BankC - $250. Call the getBalance method from the main method and print the balance of the three banks.

**Project (8 points)**

We have started writing a class named Triangle with three fields. In the next tasks we are going to finish implementing it (without touching the word private).

public class Triangle {

    private int a, b, c;

}

1. Add a non-parametrized constructor to the class which sets the sides to a=3, b-4, c=5 respectively. Add the perimeter() method to the class which returns the perimeter (sum of the sides).
2. The area of **any** triangle can be calculated using so called Heron’s formula, which is written in the following way:


where **s** is the semi-perimeter of the triangle, meaning


Add the area() method to the class which returns the area of the triangle.

1. If we want to actually use the class anywhere, we need a way to assign the sides dynamically. Add a constructor with three parameters for the three sides, and getters/setters to the class.
2. Implement a “RightTriangle” child class with the same two constructors, and override the area() method in it to calculate the area of a right triangle (with a 90 degree angle) instead

$$A=\frac{ab}{2} $$