**Java Midterm – Variant 1 (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 point each)**

1. The name of the class in Java has to match the name of the file.
2. Variable name can begin with a letter, "$", or "\_".
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 for 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. Each method in a class must have a unique name.
8. When a method or a variable in a class is declared as private, it can only be accessed by the methods within the same class

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

1. The default Math.max function in Java only supports two numbers, so let’s fix it! Implement a goodMax() function that will take in two doubles, three doubles or an array of doubles, and return the maximum value.
2. Write a Java program that reads a positive integer (from the console) and sums all the digits in the integer.
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. The fibonacci sequence is a sequence of numbers where each subsequent value is the sum of the previous two values, so the whole sequence is: 0, 1, 1, 2, 3, 5, 8, 13, 21 and so on. Define a recursive fibonacci(n) method that returns the nth fibonacci number, with n=0 representing the start of the sequence.
5. Create an abstract class Student that contains a method takeExam(), implement the method in the child classes BachelorStudent and MasterStudent in which BachelorStudent prints to the console “Java is a powerful language” while the Master student prints “Java and Python are both good”.

**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

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