**Java programming**

**Exercise 1 of 16**

**Instructions:**

All programs should be written, and linked to an online repository like GitHub.

A video to get you started with GitHub has been posted on Moodle.

After completing your assignment, post the link on the link on Moodle. An instructor will follow the posted link to access and grade your work.

Note that: Your program should always be well-commented. At the top of your source code file, you should write a short description of what your program does and add other comments to help in explaining your code.

All of your variables should be given a deceptive name. Avoid giving your variables names like a, b, I, x, y etc.

In case you copy your friend's work, you both get a Zero (0).

**Section 1:**

1. Explain the differences between primitive and reference data types.

Primitive type stores values directly in the memory location and have fixed sizes while reference type it stores a reference to the actual data in the memory

1. Define the scope of a variable (hint: local and global variable)

Global variable is a variable declared at the class level and is accessible throught the class while local variable is declared within a method and it is limited to the block in which it is declared

1. Why is initialization of variables required.

To prevent Garbage Values: Depending on what was previously kept in that memory address, a variable that has been declared but not initialized may have a random value. This arbitrary or junk value may cause the software to behave strangely or include problems.

Compiler Optimization: When variables are initialized correctly, some compilers are able to optimize code more effectively. Setting initial values for variables may enable the compiler to produce code that uses less memory or is more effective.

Preventing Undefined Behavior: Using a variable before it has been initialized in some programming languages can result in undefined behavior, which can cause the program to act erratically or crash.

Defined Starting Point: Initializing variables is a prerequisite for using them in many programming languages. This is a guideline of syntax intended to maintain clarity and guard against errors brought on by improperly setup variables.

1. Differentiate between static, instance and local variables.

Static variables are part of the class itself and do not belong to any individual instances of the class; they are declared using the static keyword.

Instance variables are declared within a class but outside any method.

Local variables have a restricted scope and are declared inside a constructor, block, or method. They only exist while the block or method call is being executed.

1. Differentiate between widening and narrowing casting in java.

Widening casting safely converts smaller types to larger types. Narrowing casting requires explicit conversion from larger to smaller types and can lose data.

1. the following table shows data type, its size, default value and the range. Filling in the missing values.

|  |  |  |  |
| --- | --- | --- | --- |
| **TYPE** | **SIZE (IN BYTES)** | **DEFAULT** | **RANGE** |
| boolean | 1 bit | false | true, false |
| Char | 2 | \u0000 | ‘\0000’ to ‘\ffff’ |
| Byte | 1 | 0 | -128 to 127 |
| Short | 2 | 0 | -215 to +215-1 |
| Int | 4 | 0 | -2,147,483,648 to 2,147,483,647 |
| Long | 8 | 0L | -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 |
| Float | 4 | 00.0f | -3.4E+38 to +3.4E+38 |
| Double | 8 | 0.0d | -1.8E+308 to +1.8E+308 |

1. Define class as used in OOP

It is an essential concept that serves as an outline for making objects

1. Explain the importance of classes in Java programming.