

Programming Languages
CSCI 3055U
Assignment 1

All programming questions are to be implemented using *Scala*.

1. Convert the following object oriented code to an implementation that uses closure and functions as values.

Object oriented version in Java:

```
class Person {
    private int age;
    private String name;
    public Person(String name, int age) {
        this.name = name;
        this.age = age;
    }
    public int getAge() { return this.age; }
    public int getName() { return this.name; }
    public int grow() { this.age += 1; return this.age; }
}
```

You are to provide an alternative implementation that can be used as follows:

```
val (age, name, grow) = makePerson("Clark Kent", 28);
println(age())      // 28
println(name())     // Clark Kent
println(grow())     // 29
println(grow())     // 30
println(grow())     // 31
```

2. Implement the *quicksort* algorithm using functional programming. You should only use immutable data structures. Your implementation takes on the form of a function with the following signature:

```
def quicksort[K](comparator: (K,K) => Int)(input: List[K]): List[K] {
    ...
}
```

3. For (2), answer the following questions.

3.1 What is the advantage of making *quicksort* a curried function?

3.2 What would be the Java-equivalent way of achieve the curried version of *quicksort*?

Submission:

1. **part1.scala** [40]

This should contain *both* the implementation of *makePerson* function, and the test code as indicated above.

2. **part2.scala** [40]

This should contain both the implementation of *quicksort*, and a testing code to ensure that the implementation is correct.

3. **part3.pdf** [20]

This contains the answers to 3.1 and 3.2.

All submissions are to be made via *blackboard.com*.