CS2030 Programming Methodology
Semester 2 2021/2022

9, 10 February 2022
Problem Set #3

1. Consider the following program fragment.

```
class A {
    int x;
    A(int x) {
        this.x = x;
    }
    public A method() {
        return new A(x);
    }
}

class B extends A {
    B(int x) {
        super(x);
    }
    @Override
    public B method() {
        return new B(x);
    }
}
```

   Does it compile? What happens if we switch the `method` definitions between class `A` and class `B` instead? Give reasons for your observations.

2. Consider a generic class `A<T>` with a type parameter `T` with a default constructor. Which of the following expressions are valid (with no compilation error) ways of creating a new object of type `A`? We still consider the expression as valid if the Java compiler produces a warning.

   (a) `new A<int>()`

   (b) `new A<>()`

   (c) `new A()`

3. Compile and run the following program fragments and explain your observations.

(a)
```
import java.util.List;

class A {
    void foo(List<Integer> integerList) {}
    void foo(List<String> StringList) {}
}
```

(b)
```
class B<T> {
    T x;
    static T y;
}
```

(c)
```
class C<T> {
    static int b = 0;

    C() {
        this.b++;
    }

    public static void main(String[] args) {
        C<Integer> x = new C<>();
        C<String> y = new C<>();

        System.out.println(x.b);
        System.out.println(y.b);
    }
}
```