May 1, 2020

COMP6510 – Programming Languages
Inheritance Assignment 2

Question Set 1

(a) Species class inherits from Genus class.
(b) Species object is a variable in Specimen class.
(c) Species
    -speciesName:String
    +Species(s:String)
    +getSpeciesName():String
    +setSpeciesName(s:String):void
    +toString():String
    +equals(s:Species):boolean
(d) 1. Minimize duplicate code because subclass will inherit all the variables and methods of superclass.
    2. Which means you also only need to test methods once (from superclass only).
(e) (i) No error because Species extends Genus so the method can override.
(e) (ii) Polymorphism

Question Set 2

(a) Grouping together the data (variables) and the methods that operate the data.
(b) 1. Protects the data from other classes.
    2. You access data with getter and setter methods so you can add validation checks.
(c) public String getName()
(d) private String name
(e)
```java
public class Genus {
	private String genusName;

	public Genus(String genusName) {
		this.genusName = genusName;
	}

	public String getGenusName() {
		return genusName;
	}

	public void setGenusName(String genusName) {
		this.genusName = genusName;
	}

	@Override
	public String toString() {
		return "Genus: " + getGenusName();
	}
```

```
}
```

(f) Advantage: Specimen will inherit variables and methods from Species so it will be easier to access.
Disadvantage: Different Specimens may have different variables and methods from each other.

Question Set 3

(a) If the "markings" belong to each individual animal that means the description will be an instance variable in the Specimen class. Also we need to add getter and setter methods for this new variable, and we need to update the toString() method to include the "markings" description.

(b)
```
public void countSpecimens(Specimen[] animals, Species s) {
    int numberOfSpecimens = 0;
    for (int i = 0; i < animals.length; i++) {
        if(s.equals(animals[i].getTOA()))
            numberOfSpecimens++;
    }
    System.out.println(numberOfSpecimens);
}
```

(c) // listSpecies(Specimen[] animals)

Question Set 4

(a) Implementation details are hidden and it uses methods to access data.

(b) // LinkedList makeList(Specimen[] animals)

(c) // makeSpeciesList(LinkedList animals)

(d) // makeSpeciesListUnique(LinkedList allSpecies)