Inheritance Lab

1. Declare all the necessary classes in order to make the following driver program work properly (steps have been broken down for you in the sub-parts). You are not allowed to change the driver program in any way. For example, this is a sample output that is acceptable:

   Generally, a Dolphin can be found in water, it can not lay eggs, and is often overheard saying 'ak, ak, ak, ak'
   Generally, a Platypus can be found on land, it can lay eggs, and is often overheard saying 'errrr'
   Generally, a Human can be found on land, it can not lay eggs, and is often overheard saying 'I'll take a grande latte with a double-shot of espresso'
   Generally, a CSStudent can be found on land, it can not lay eggs, and is often overheard saying 'I love programming!'

```
void setup(){
  Mammal[] mammals = new Mammal[4];
  mammals[0] = new Dolphin();
  mammals[1] = new Platypus();
  mammals[2] = new Human();
  mammals[3] = new CSStudent();

  for (int i=0; i< mammals.length; i++){
    print("Generally, a " + mammals[i].getName());
    print(" can be found ");
    if(mammals[i].livesInWater() == false){
      print("on land, ");
    }
    else {
      print("in water, ");
    }

    print("it can ");
    if(mammals[i].laysEggs() == false) {
       print("not ");
    }
    print("lay eggs, and is often overheard saying '");
    mammals[i].speak();
    println("'");
  }
}
```

a. Declare a new class called `Mammal` with the following members:
    i. Two `String` instance variables called `name` and `sound`
    ii. A constructor that accepts two `String` parameters (`name` and `sound`) and saves values in the corresponding instance variables
    iii. A void method `speak()` that prints the object's `sound` to the console area,
    iv. A boolean method `laysEggs()` that returns false
    v. A boolean method `livesInWater()` that returns false.
    vi. A "getter" `String` method `getName()` that returns the object's `name` instance variable value;
b. Declare a new class called `Platypus` that extends `Mammal`. Override methods as appropriate.
c. Declare a new class called `Dolphin` that extends `Mammal`. Override methods as appropriate.
d. Declare a new class called `Human` that extends `Mammal`. Override methods as appropriate.
e. Declare a new class called `CSStudent` that extends `Human`. Override methods as appropriate.

2. Trace the following code. (Draw a table with the appropriate variables and instance variables.) What are the intermediate values of each array element? Show what is printed in the correct order.

```
class A {
  int x;
  A(int x) {
     this.x = x;
  }
  void b(int i){};
}
class B extends A {
  B(int y) {
    super(y * y);
    println(x);
  }
  void b(int i){
    x = x + i;
  };
}

A[] array;

void setup() {
 array = new A[3];
 for (int i = 0; i < array.length; i++) {
   if (i % 2 == 0) {
     array[i] = new A(i);
   } else {
     array[i] = new B(i);
   }
 }
 for (int j = 10; j < 13; j++) {
   int k = j % array.length;
   array[k].b(j);
   println(array[k].x);
 }
}
```