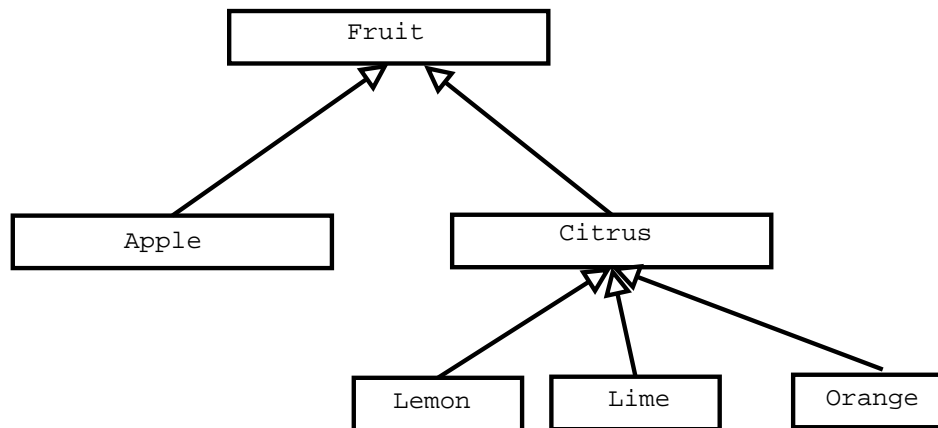# Homework Assignment 1

Due date: September 10, 11:55PM EST.

The problems in this homework requires you to review some concepts that should have been covered in CSCI 101.

Problem 1

Suppose that `Fruit`, `Apple`, `Citrus`, `Lemon`, `Lime`, `Orange` are classes defined in the following inheritance hierarchy.

A. Can you create the following objects in a way specified? For each of them state "yes" if you can, or explain why not. Assume that each class provides default constructor.

   (a) `Fruit f = new Citrus();`
   (b) `Fruit f = new Lime();`
   (c) `Citrus c = new Fruit();`
   (d) `Citrus c = new Orange();`
   (e) `Apple a = new Citrus();`
   (f) `Citrus c = new Citrus();`

B. Each of the default constructors contains a print statement that states which classes constructor is called. `Fruit` class constructor prints "Fruit constructor called"; `Apple` class constructor prints "Apple constructor called"; and so on. Show the output when the following objects are created:

   (a) `Fruit f = new Lemon();`
   (b) `Apple a = new Apple();`

Problem 2

Consider the following class definition

```java
public class Foo implements Comparable<Foo>{

    double x;
    double y;

    public Foo ( double x, double y ) {
        this.x = x;
        this.y = y;
    }

    public int compareTo ( Foo other ) {
        double d1 = x*x + y*y;
        double d2 = other.x * other.x + other.y * other.y;
        if ( d1 < d2 ) return -1 ;
        if ( d1 == d2 ) return 0;
        return 1;
    }

    public String toString ( ) {
        return "( " + x + ", " + y + " )"; //returns ( x, y )
    }
}
```

Given the array `fooList` of Foo objects pictured below (the values of x and y data fields are stated for each array element), show what the array will look like after the call to `Arrays.sort(fooList)`.

0	1	2	3	4	5	6	7	8	9
x=1.0	x=-2.0	x=1.0	x= 1.0	x=2.5	x=-1.0	x=0.0	x=-1.0	x=0.0	x=0.0
y=1.0	y= 2.0	y=2.0	y=-1.0	y=0.0	y= 0.0	y=3.0	y=-4.0	y=0.0	y=1.5

Problem 3

Write a method that given a sorted `ArrayList` object of Java strings (objects of class String) removes all duplicates. Your method should modify the `ArrayList` object passed to it. The method should return a boolean value indicating if the list was modified or not (`true` for "has been modified", `false` for "has not been modified"). For example, if the original list passed to your method contains the following strings:

    Argentina, Chile, Chile, Czech Republic, France, Georgia, India, India,
    Poland, Romania, Romania

your method should remove one occurrence of Chile, India and Romania. The resulting list should contain:

    Argentina, Chile, Czech Republic, France, Georgia, India, Poland, Romania

How and what to submit

You can (but do not have to) use the template provided at

https://docs.google.com/document/d/1PqiJ7AdMJa0fxhEK9RQwKAWukXjQZ_7TrkZOZr6Fhz0/edit?usp=sharing

to complete your solution.

The completed solutions should be submitted as a single PDF document to NYU Classes.

<u>**Warning**</u>: Make sure you submit a PDF document. We will ignore any files that are not PDF (that includes text files, Word documents, Google docs, RTF files, etc.).