**Lab 1**

(a) Inheritance (2 point)

A numeric progression is a sequence of numbers, where each number depends on one or more of previous numbers.

Design and implement two classes that define arithmetic and geometric progression.  
  
Start by defining a parent [class](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  called Progression. This [class](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  should contain  
the following [instance variables](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) :  
• first – first value of the progression  
• cur – current value of the progression   
Both [variables](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  should be [initialized](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  with [values](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  passed into the [constructor](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) .  
  
Progression should also have three methods:  
• firstValue() – Reset the progression to the first value, and return that value .  
• nextValue() -Step the progression to the next value and return that value.

• printProgression(n) – Reset the progression and print the first n values of progression.  
  
Two classes should inherit from Progression:

* ArithProgression that defines and prints out an arithmetic progression, where the next value is determined by adding a fixed increment to the previous value. Set the default increment to 1 in the default constructor. Provide setinc() method to set the increment value.
* GeomProgression that steps and prints out a geometric progression, where the next value is determined by multiplying the previous value by a fixed base. Set the default base to 2 in the default constructor. Provide setbase() method to set the base value.

Test the classes in a Driver [class](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) . In the Driver [class](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) ,

* Print out the 10 Arithmetic progression with default increment and increment by 5 using constructor. Use setinc method to set increment by 10 and print out 10 Arithmetic progression also.
* Print out the 10 Geometric progression with default base, base equal to 3 by using constructor. Use setbase method to set base equal to 5 and print out 10 Geometric progression also.

(b) Polymorphism: (1 point)

Implement the Speaker interface:  
  
public interface Speaker {  
public void speak();  
public void announce([String](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  str);  
}  
  
Then, create three classes that implement Speaker in various ways: 

* SpeakerOfTheHouse: speak [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  prints "I am Speaker of the House.", and   
  the announce [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  takes the [**name**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a bill in the form of a [**string**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)   
  and prints it in the sentence "The [bill] has passed!"
* SportsAnnouncer: speak [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  prints "Goal!", and the announce [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)   
  takes the [**name**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a team in the form of a [**string**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  and prints the sentence  
  "The [team] have scored a goal!"
* Actor: speak [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  prints "I've been nominated for three Academy   
  Awards.", and the announce [**method**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  takes the [**name**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a movie in the form  
  of a [**string**](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  and prints the sentence, "I'm currently staring in [movie]."

Create a driver [class](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) , and in the [main method](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) , prompt the user to enter three  
[Strings](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  -- the [name](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a bill, the [name](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a sports team, and the [name](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of a movie.  
Then, create an [object](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  from each of the classes described above and call the speak   
and announce [methods](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  of each [object](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?) , using the [strings](https://pearson.turingscraft.com/codelab/jsp/core_dhtml.jsp?)  provided by the user.

(c) Using Classes in java Library (1 points)

(1) Write a program

* to create a 2x10 two dimensional integer array.
* use Math.random() from java.util.Random to generate 20 integer numbers from 100 to 1000
* store each random number in the two dimensional array.
* At the end, print the array. Then switch numbers between two rows then print the array again.

(2) Design and implement an application that

* Uses the Random function to generate eight uppercase characters
* Concatenate all eight characters to a String.