Retake Exam: Introduction to Programming, Media Technology Program, LIACS – February 3, 2012

Good luck! Amalia

1- Explain in your own words what is
(a) `boolean`
(b) `return`
(c) the scope of a variable

2- What is the output of the following piece of code? Show me how you reached your answer; just giving the correct value(s) gives you no points!

```
int a = 5;
while( ( 7 <= a ) && !( false || 2*a >= a ) ) {
    println(a);
    int b = a ;
    a++;
}
```

3- What is the output of the following piece of code? *SMHYRYA*!*

```
void setup(){
   int i = 8;
   doubleValue(i);
   println(i);
}

void doubleValue(int i) {
   i= i*2;
}
```

4- What is the output of the following piece of code? *SMHYRYA*!*

```
int b = 1;
for (int a = b; pow(a, b) <= 100; a += b) {
   if ( b%2 != 0 ) { //the % operator calculates the remainder of an integer division
      a *= -1;
   }
   println(a);
   b++;
}
```

Tip: You may consider the following template to organize your answers; not all steps are always applicable:

init	condition	enter for-loop body	if-condition	console output	exit for-loop body	update
a = ?? b = ??	??	a = ?? b = ??	??	??	a = ?? b = ??	a = ?? b = ??

5- Write a function `answerToTheUltimateQuestionOfLifeTheUniverseAndEverything()` that provides the answer to the Ultimate Question of Life, the Universe and Everything. The answer to the Ultimate Question of Life, the Universe and Everything is 42. Your function does not need any parameters.

6- Array `a` is `{7, 3, 9, 10, 1, 0}`. What is the value of

`a[ a.length - max(a[1], a[4]) ]` ? *SMHYRYA*!*

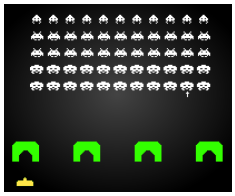
---

*Show me how you reached your answer; just giving the correct value(s) gives you no points.

7- Write a function `replaceNElements()` that replaces the first N elements of an array of integers with the integer X. Your function should manipulate a global array of integers and should receive two parameters, i.e. the integers N and X. For example,

```
void setup(){
   int myArray = {1, -5, 200, 1, -3};
   replaceNElements(3, 0);              //replace first 3 elements with 0s
   println (myArray);                   //myArray is now {0, 0, 0, 1, -3}
}
```

Do you foresee any issues with the value of N? If so, include a solution in your implementation.



8- (a) Suppose you are implementing the game of Space Invaders (cf. figure). How many classes will you need to implement the defence bunkers (i.e. big green things at the bottom)? How many objects? How many constructors? Briefly explain your answers.

(b) The following class declaration contains 4 errors. Find them and correct them. Briefly explain your answers.

```
class Cat {
 String name;
 int age = 10;

 Constructor(String cuteName) {
   age = (int) random (2,5);
   cuteName = name;
 }

 void grow() {
  cat.age++;
 }

 void rename(String cuteName) {
  name = new cuteName();
 }

}
```

9- Fill in the missing code so that the following function implements the bubblesort algorithm. Make sure the elements end up in ascending order (i.e. going up)!

```
int[] bubbleSort(int[] a) {
  int temp;
  for (int i =  a.length-1 ; i ______ ; ______ ) {
    for (int j = ______ ; j < i ; ______ ) {
      if ( ______ ) {
        temp = ______ ; ______ = ______ ; ______ = temp;
      }
    }
  }
  return(a);
}
```

10- Write a *recursive* function that raises an integer value A to the power B. For example, "5 to the power 3" equals 5 x 5 x 5 which equals 125. You can assume that both A and B are positive integers.