Exam
Introduction to Programming, Media Technology Program, LIACS
January 9th, 2013

The Processing Part

Please write down your answers on your answer papers; notes on the exam will not be graded. Use a blue or black pen only and make sure your name and student number is recorded on all your answer papers. At the end of the exam, please hand in both your answers papers and the exam.

Good luck!
Amalia

Duration:
You have 3 hours to complete the entire exam (Processing part + MAX part). You can not leave the room for the first 30 minutes as other students may still enter the exam.

1. (1.5 points) Explain the difference between
   a) = and ==
   b) a stack and a queue
   c) `if (true) {}` and `while (true) {}`

2. (1 point) 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.

```
boolean someVariable = (max(50+2*3, 100) == 100);
println ( !someVariable || random(5,10)<0 || false);
```

Note: `random()` is a build-in Processing function that returns a random floating point value. If one argument is passed to the function, the function will return a float between zero and the value of the argument. If two arguments are passed to the function, it will return a float with a value between the two values.

3. (1 point) Fill in the missing code to make a program that prints all whole numbers by which integer value `n` can be exactly divided.

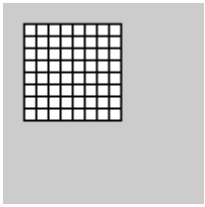
   Example: If `n` has value 18, then the program should print the numbers 1, 2, 3, 6, 9, 18.

```
//please write your answers on your answer paper only!
_____ n = 18;

for (int i=1; _______; _______ ) {
  if (( ___ % i) _______ ) {
    println( ___ );
  }
}
```

Note: `%` is the modulo operator that calculates the remainder when one number is divided by another.

4. a. (1 point) Write a function `void drawGrid(int x, int y, int sz)` that draws an 8x8 grid at position `x,y` (top corner of the grid) and of size `sz`.



   Example: For a screen size of 100x100, a call to `drawGrid(10, 10, 50)` should result as shown:

   b. (0.5 points) Use the `drawGrid` function from part (a) to draw a grid at the position of your mouse every time a `mousePressed()` event is detected. The size of your grid should equal the ¼ of your screen size.

```
void mousePressed() {
//please write your answers on your answer paper only!
_______________________
}
```

5. a. (0.5 points) Array `arr` is `{3, 9, 0, 10, -1}`. What is the value of `arr[ arr.length - arr[0] - 1 ]`

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

   b. (1 point) Write a function `int sumFirstNElements(int[] arr, int n)` that adds up the first `n` elements of an array of integers `arr`. Your function should return the sum of the first `n` elements of `arr`. Make sure your solution prevents any issues with the value of `n`.

   Example: For array myArray= {1, 20, 3, 10, 30}, a call to `sumFirstNElements(myArray, 3)` should return the number 24.

6. (1 point) What is the output of the following pieces of code? Show me how you reached your answer; just giving the correct value(s) gives you no points.

A.
```
void setup(){
  int x =15;
  increaseByFive(x);
  println(x);
}

void increaseByFive(int x){
  x =x+5;
}
```

B.
```
void setup(){
  int x =15;
  increaseByFive();
  println(x);
}

void increaseByFive(){
  x =x+5;
}
```

7. a. (0.5 points) Explain the difference between a "class" and an "object". Give an example!
   b. (1 point) Given the following class

```
class Monster {
String name;
int numberOfHeads;
}
```

   add a constructor that initializes the fields of the class with user provided parameters. Then write down the statements needed to create a monster named Scylla with 6 heads and a monster named Charybdis with 1 head.

8. (1 point) Consider the following recursive function:

```
int mysterious(int a) {
   if (0 == a) {
      return 1;
   }
   else {
   return a*mysterious(a-1);
   }
}
```

   a. Why is this function called recursive? What is the terminating condition of this recursion?
   b. What is the result of `mysterious(3)`? Write down all the function calls involved.