Introduction to Programming (IP) – The Processing part

Media Technology, LIACS
Retake
February 13th, 2014

Instructions

- You have 3 hours to complete the entire exam (Processing part + MAX part). Please note that you can not leave the room during the first 30 minutes as other students may still enter the exam.
- Write all your answers on the answer sheets provided. Feel free to make notes on the exam but these note will **not** be graded. Please use a (blue or black) pen for your answers.
- At the end of the exam, please hand in both your answer sheets and the exam.

Good luck!
Amalia

1. (1.5 point) Explain the difference between
   a) `==` and `=`
   b) `random(5)` and `(int)random(5)`
   c) a queue and a stack

2. (1.5 point) Fill in the missing code so that the following piece of code draws `n` stripes of alternating color equally distributed across your screen (cf. figure).

```
//please write your answers on your answer sheet only!
int n = 7;
int sz = width/ _____ ;
for (int i = 0; _____ ; _____) {
  if ( (_____ % 2) _____ ) {
  fill(0);
  }
  else {
  fill(_____);
  }

int x = _____ * _____ ;
rect(x, _____ , sz, _____);
}
```

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

3. (1 point) a)
   Write a function `answerToTheUltimateQuestionOfLifeTheUniverseAndEverything()` that returns 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).

   b) The following piece of code does not work. Why? Explain your answer and propose a solution.

```
int j=8;
for (int i=0; i<5 && j>0 ; i-= -1) {
if (i+j>8) {
i = j; j--;
}
}
println(i);
```

4. (1 point) You have a lottery ticket with integers `a, b, c` on it. You win the lottery if and only if your ticket contains two of the same numbers. However, you never win the lottery if your ticket contains the unlucky number 7. Write the proper `if`-statement(s) to check if your ticket wins the lottery. You can assume that `a, b, c` are declared and assigned their values.

5. (1 point) Array `a` is {4, 3, 0, 6, 1, 5} and array `b` is {-3, 2, 6, 1, 7}. What is the value of

```
a [ b[ b.length - a[1] ] ]
```

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

6. (1 point) Given a global array of integers `arr`, write a function `void overwriteRange(int r1, int r2, int n)` that replaces any value between `r1` and `r2` (inclusive) with the value `n`. You can assume that array `arr` is declared and assigned its values. Do you foresee any issues with the values of `r1` and `r2`? Make sure that your code prevents them.

   Example: For array arr = {1, 2, 3, 4, 5}, a call to `overwriteRange(2, 4, 100)` should result in arr = { 1, 100, 100, 100, 5}

7. (1 point) (a) Explain the difference between a "class" and an "object". Provide an example.
   (b) The following class declaration contains 3 errors. Find them and correct them. Briefly explain your answers.

```
class Monster {
int legs;

Constructor(int numberOfLegs) {
numberOfLegs = legs;
}
void grow() {
monster.legs++;
}
}
```

8. (1 point) Given array `a= {7, 2, 2014, 8, 3}`, apply the "bubble sort" algorithm to sort `a`, i.e. write down the state of the array after each swap. Sort in ascending order (from small to big).

9. (1 point) Fill in the missing code so that the following function calculates the power of A to the N *recursively*. For example, "5 to the power 3" equals 5 x 5 x 5 which equals 125. You can assume that both A and N are positive integers.

```
int power(int A, int N) { //positive integers only
  if (N == 0) {
    return _____________;
  }
  else {
    return _____________;
  }
}
```