Introduction to Programming (IP) – The Processing part

Media Technology, LIACS
Exam
January 7th, 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) a `void` function and a `float` function
   c) `if (true) {}` and `while (true) {}`

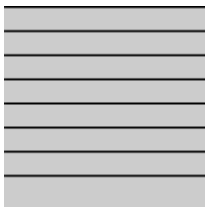
2. (1 point) What is the output of the following piece of code? Show me how you reached your answer; just giving the correct value(s) gives you no points.

```
int a = 5;
boolean b = (a < 2 + 4*3) && !( a <= a );
if ( b || random(4, a) > 0 ) {

println("So long");
}
println("Goodbye");
```

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 gaps so that the following piece of code draws 8 horizontal lines equally distributed across your screen (cf. figure).



```
//please write your answers on your answer sheet only
int n = 8;

for (______ i = 0; ______ ; i++) {
  int y = i ______ (height/_______);
  line(______, y, ______, y);
}
```

4. (1 point) You have a lottery ticket with integers `a, b, c` on it. You win the lottery if and only if it is possible to add two of the integers to get the third. 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.

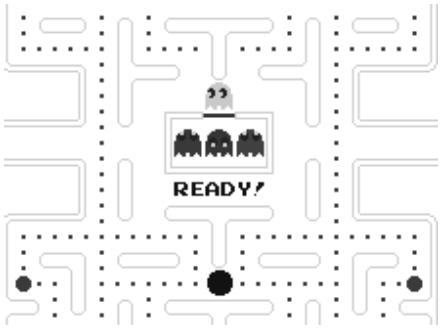
5. (1 point) (a) Write a function `void drawGhost(int x, int y)` that draws a ghost shape at location `x,y` (cf. figure). The size and proportions of your ghost are up to you but `x` and `y` should represent the top left corner of the shape. Feel free to first decompose your shape in a drawing.

(b) Write down the statements needed to draw a ghost at the position of your mouse cursor using your function from part (a).

6. (1.5 points) Write a function `int occurences(int[] list, int n)` that examines an array of integers `list` for the occurrence of an integer number `n`. Your function should return one value i.e. how many times `n` appears in `list`.

   Example: For array arr = {8, 8, 8, 0, 0, 8}, a call to `occurences(arr, 8)` should return the number 4.

7. (1 point) (a) Suppose you are implementing a game of Pac-Man (cf. figure). How many classes will you need to implement the ghosts? How many objects? How many constructors? Briefly explain your answers.



   (b) Given the following class

```
class Pony {
int age;
String name;
}
```

   add a constructor that initializes the fields of the class with user provided parameters. Then write down the statements needed to create two instances of this class.

8. (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..

```
void setup(){
   int x = 10;
   multiplyByTwo(x);
   println(x);
}

void multiplyByTwo(int x){
x = x * 2;
}
```

9. (1 point) Consider the following recursive function:

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

   (a) Why is this function called recursive? What is the terminating condition of this recursion?
   (b) What is the result of mysterious(10, 4)? Write down all the calls involved!