CMSC110 Introduction to Computing

Lab#4
Week of September 19, 2016

Today, our goal is to understand how loops work, and how to make loops work for you. For each of the questions below, first enter the following code in Processing:

```
void setup() {
  size(300, 50);
  background(0);
  noLoop();
} // setup()

void draw() {
  textSize(24);
  text("Look at the console.", 20, height/2);

  // Enter below, the commands from your questions to try:
  …CODE FRAGMENTS FROM QUESTIONS BELOW TO BE ADDED HERE…
} // draw()
```

1. Consider the code fragment below:

```
for (int i=1; i <= 10; i++) {
  println(i);
}
```

On the right hand side, write down what you think the output will be from the above for-loop. Once done, enter the code in the program above, run it.

Does the output match what you wrote above? YES/NO _____

2. Next, consider the code fragment below:

```
for (int n=1; n <= 10; n=n+2) {
  println(n);
}
```

On the right hand side, write down what you think the output will be from the above for-loop. Once done, enter the code in the program above, run it.

Does the output match what you wrote above? YES/NO _____

3. Rewrite the for-loop from Question 1 to use a while-loop instead.

Examine the code you have written carefully to make sure it mimics the code precisely. Next, enter this code and run it.

Does the output match what you wrote above? YES/NO _____

4. Next, rewrite the code from Question 2 to use a while-loop.

Examine the code you have written carefully to make sure it mimics the code precisely. Next, enter this code and run it.

Does the output match what you wrote above? YES/NO _____

5. Consider the code fragment below:

```
int x = 0;
while (x < 100) {
    if (x % 5 == 0) {
        println(x);
    }
    x = x + 1;
}
```

In one sentence below describe what the condition in the while-loop is testing.

On the right hand side, write down what you think the output will be from the above loop. Once done, enter the code in the program above, run it.

Does the output match what you wrote above? YES/NO _____

6. What difference would it make if the condition in the while-loop in Question 5 were to be changed to: **(x <= 100)**

   On the right hand side, write down what you think the output will be from the above loop. Once done, enter the code in the program above, run it.

   Does the output match what you wrote above? YES/NO _____

7. Consider the code fragment below:

```
int sum = 0;
int N = 5;
// Compute the summation: 1+2+3+…+N
for (int term=1; term <= N; term++) {
    sum += term;
}
println(sum);
```

   On the right hand side, write down what you think the output will be from the above for-loop. Once done, enter the code in the program above, run it.

   Does the output match what you wrote above? YES/NO _____

8. Consider the code fragment below:

```
int sum = 0;
int N = 10;
// Compute the summation: 1-2+3-4+…(+/-)N
for (int term=1; term <= N; term++) {
    if (term % 2 == 0) {
        sum -= term;
    }
    else {
        sum += term;
    }
}
println(sum);
```

   On the right hand side, write down what you think the output will be from the above for-loop. Once done, enter the code in the program above, run it.

   Does the output match what you wrote above? YES/NO _____

9. Consider the code fragment below:

```
int y1 = 50;
int y2 = height-50;

for (int i=1; i < 10; i++) {
    int x = i*25;
    line(x, y1, x, y2);
}
```

On the right hand side, draw what you think the output will be from the above for-loop. Once done, enter the code in the program above, run it.

Does the output match what you wrote above? YES/NO _____

10. Consider the code fragment below:

```
void setup() {
    size(500, 500);
    background(255);
    noLoop();
} // setup()

void draw() {
    flower(width/2, height/2, 300); // ←Change flower size
} // draw()

void flower(int x, int y, int flowerSize) {
    int n = 12;  // ←Change 12 to other values (# petals)
    fill(223, 70, 252, 120);
    noStroke();
    ellipseMode(CORNER);

    pushMatrix();
    float angle = TWO_PI/n;
    translate(x, y);
    for (int i=1; i <= n; i++) {
      rotate(angle);
      ellipse(0, -10, flowerSize/2, flowerSize/8); ←Change -10 to 0
    }
    popMatrix();
} // flower()
```

Understand, then enter, and run the program above. Experiment with different sizes, angles, etc.