Name: _____

Diagnostic Assignment — Advanced Programming & Electronics — Fall 2016

Full and partial credit will only be awarded with all work shown. Help us understand your thought process! Good luck.

Processing & Programming

1. Describe, in your own words, the role of the **`void setup()`** function in Processing and Arduino.

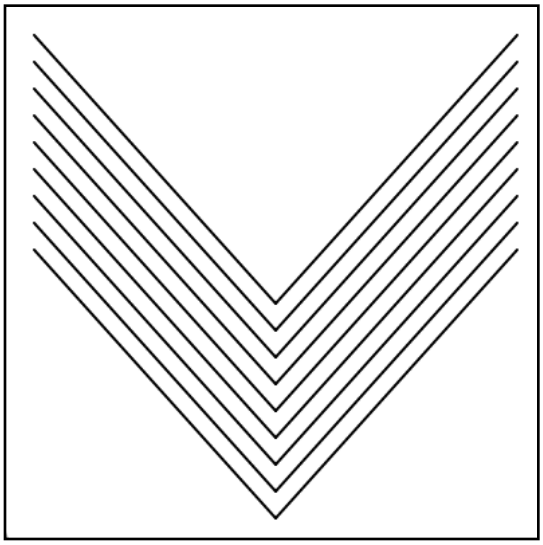
2. Describe, in your own words, the role of the **`void draw()`** function in Processing.

3. In the following code, what is printed for the final value of the variable **`z`**, after all the code runs?

```
int z = 0;
while (z < 17) {
  z = z + 3;
}
println(z);
```

4. Write code that produces the following canvas.

Canvas (200 x 200)



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5. Trace the following code.

For each new variable or variable change, update the computer memory at the bottom of the page. Show the result of each drawing command on the canvas at the bottom of the page.

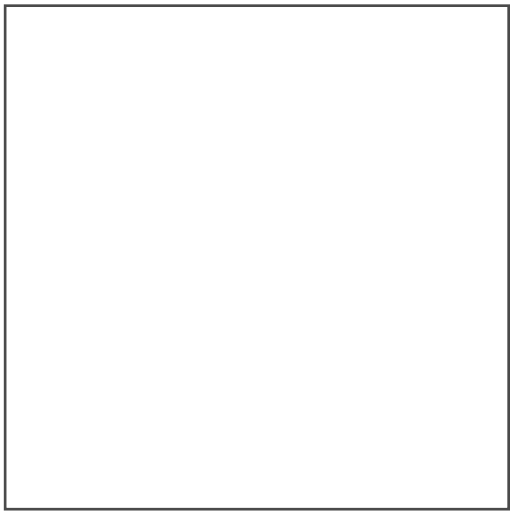
Feel free to add notes to the code if you feel they will help me understand your thought process. (Hint: remember that || means “or” in the if condition below.)

```
size(200, 200);
background(255);

stroke(0);

int offset = height/5;

for (int y = 10; y < height; y = y + 10) {
  if (y < 2 * offset || y > 3 * offset) {
    line(10, y, offset, y);
    line(width - offset, y, width - 10, y);
  } else {
    line(10, y, width - 10, y);
  }
}
```

Computer Memory

Variable Name	Variable Value

Canvas (width: height:)



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6. Analyze the code below to answer the following questions. (This code intentionally includes concepts you do not need to be familiar with.)

```
void setup() {
  size(200, 200);
  background(255);
  colorMode(HSB);
}

float radius = 0;

void draw() {
  background(255);

  noStroke();
  radius += 0.1;

  if (radius > 20) {
    radius = 0;
  }

  for (int x = 0; x < width/10; x += 1) {
    for (int y = 0; y < height/10; y += 1) {
      fill((x + width/10 * y) * 0.6375, 255, 255);
      ellipse(5 + x*10, 5 + y*10, 10-radius, 10-radius);
    }
  }
}
```

a. How many times does the `ellipse` function get called each frame by the code above?

b. **Optional challenge:** In 1000 frames, how many times is `radius` reset to 0?

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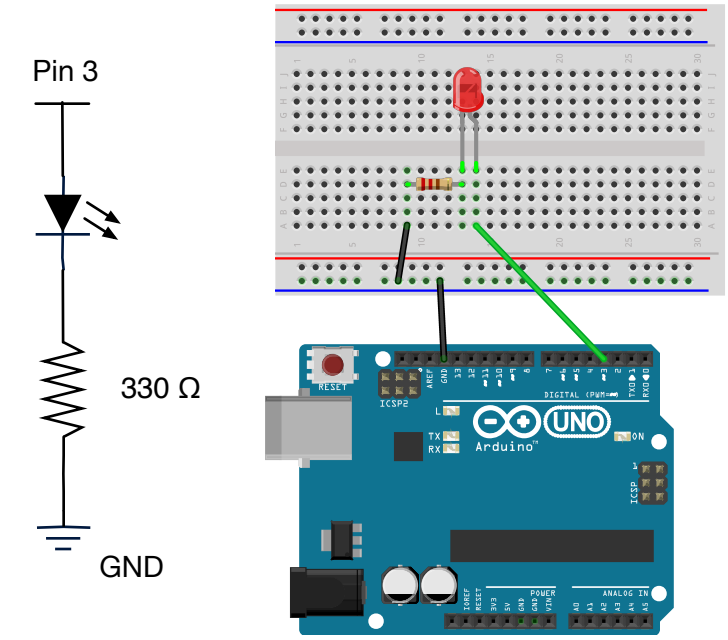
Arduino & Electronics

7. Match the following inputs and outputs to the best command to interact with each:

Set the brightness of two LEDs	`digitalWrite`
Turn on or off an LED	`digitalRead`
Read a value from a light-dependent resistor	`analogWrite`
Determine if an input is HIGH or LOW	`analogRead`

8. Write an Arduino program that blinks the LED in this circuit 10 times per second.



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9. Draw lines from the legs of the components below to where on the breadboard you would place those components to build the schematic below. Also draw lines representing wires on the Arduino and breadboard below that correspond to the connections in the schematic.