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Practice Exam — 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 **`setup()`** function in P5 and Arduino.

setup() function is to prepare the softwares to start new sketch.

2. Describe, in your own words, the role of the **`draw()`** function in P5.

draw () function is to execute the codes to draw the sketch.

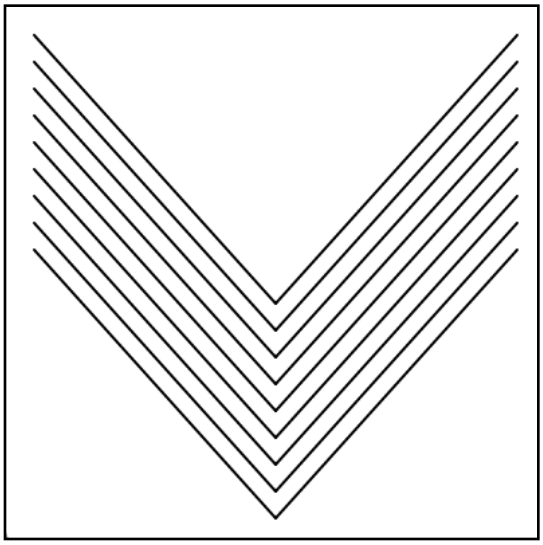
3. In the following code, what is printed for the final value of the variable **`z`**, after all the code runs?

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

15

4. Write code that produces the following canvas.

Canvas (200 x 200)



```
function setup() {
  createCanvas(200, 200);
  background(255);
}

function draw(){
  for(n=0;n<100;n=n+10){
    line(10,10+n,100,100+n);
  }
  for(n=100;n<200;n=n+10){
    line(190,n-90,100,n)
  }
}
```

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5. Trace the following code.

Every time there's a new variable, add it to the memory below. Every time a variable changes its value, 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.

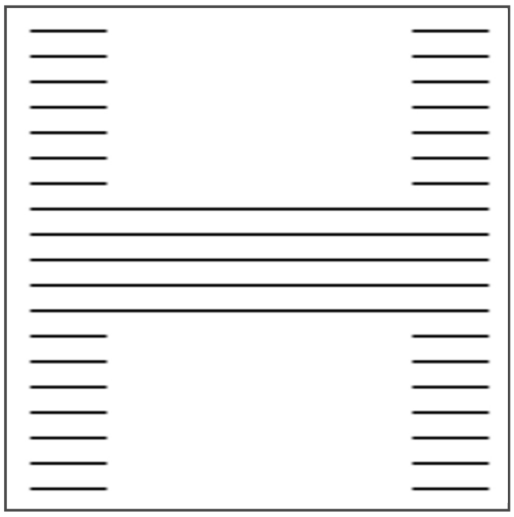
Feel free to add notes to the code if you feel they will help me understand your thought process. (Hint: remember that || means "or" in the if condition below.)

```
function setup() {
  createCanvas(200, 200);
  background(255);

  var offset = height/5;

  for (var y = 10; y < height; y = y + 10) {
    stroke(0);
    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);
    }
  }
}

function draw() {
  // nothing to do here
}
```

Computer Memory

Variable Name	Variable Value
y	10
y	20
y	30
y	40
y	…
y	200

Canvas (width: 200 height: 200)



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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.)

```
function setup() {
  createCanvas(200, 200);
  background(255);
  colorMode(HSB);
}

var radius = 0;

function draw() {
  background(255);

  noStroke();
  radius += 0.1;

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

  for (var x = 0; x < width/10; x += 1) {
    for (var 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?

400

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

5

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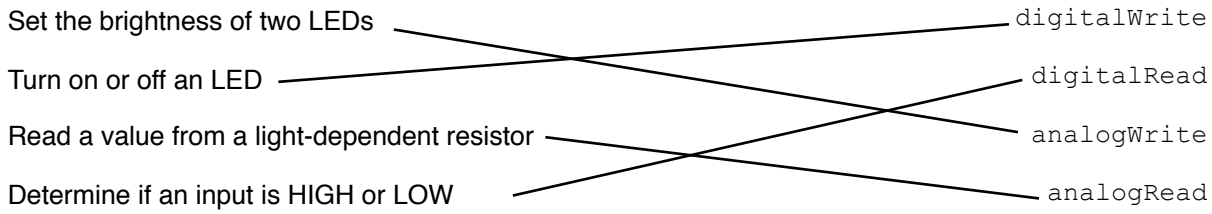
Arduino & Electronics

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

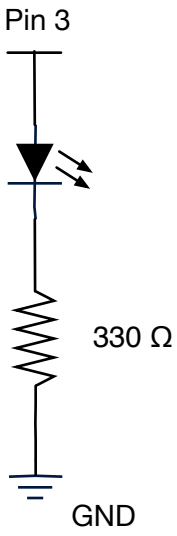


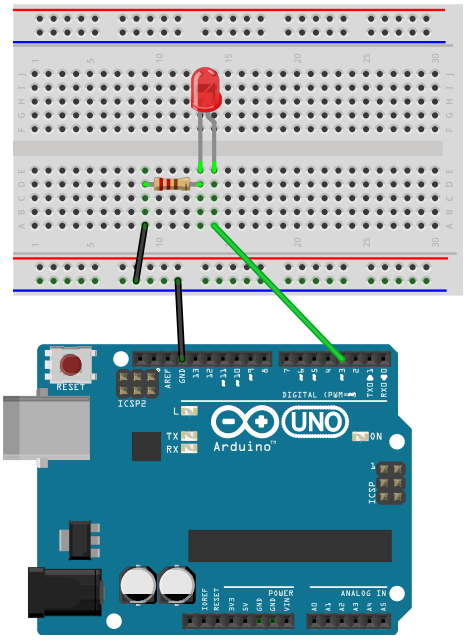
8. Write an Arduino program that blinks the LED in this circuit 10 times per second.

```
int led=3;

void setup() {
  pinMode(led, OUTPUT);
}

void loop() {
  digitalWrite(led, HIGH);
  delay(50);
  digitalWrite(led, LOW);
  delay(50);                    }
```





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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.