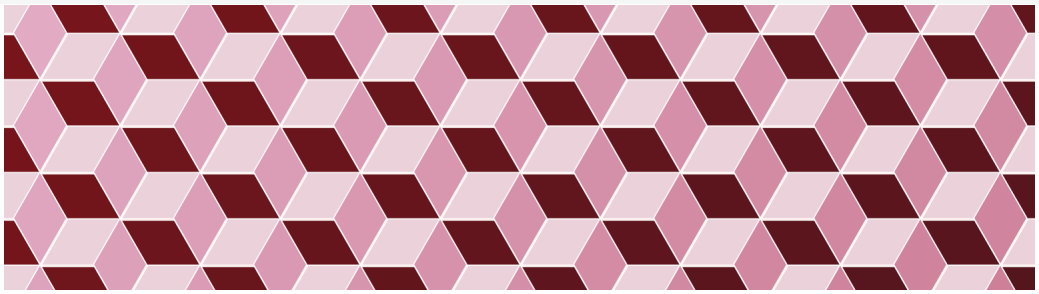

15-104 Introduction to Computing for Creative Practice

Fall 2021

10 Functions

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1

Functions

- We've used functions that are predefined.
  (e.g. `random`, `ellipse`, `rectMode`, etc.)
- We pass arguments to these functions (a function call).
  (e.g. `ellipse(50, 60, 100, 100);`)
- Each function assigns these arguments to a set of parameters.
  (e.g. `ellipse(x, y, w, h)`)
- When the function completes its computation, it can return a result.
  (e.g. `var y = floor(random(1,10));`)
- Computation continues where we left off after the function call.

2

Programmer-defined functions

- We can define our own functions that can be called from `draw` (or from each other).
- General format:

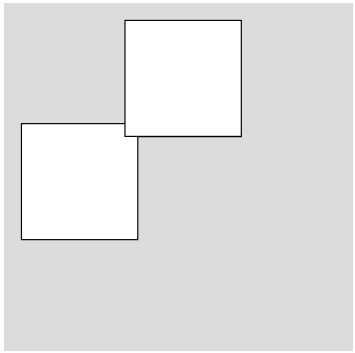
```
function name ( parameterlist ) {
    function body
}
```

- When you call a function, you should supply the same number of arguments as it has parameters.
- Your function can call other functions as well. (…including themselves!)

3

Basic Example

```
function setup() {
    createCanvas(300, 300);
    background(220);
}
function draw() {
    a(15);
}
function a(x) {
    b(x, 104);
    b(104, x);
}
function b(x, y) {
    rect(x, y, 100, 100);
}
```

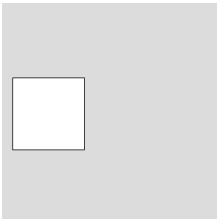


4

Odd Behavior

```
function a(value) {
    b(15, 104, value);
}

function b(x, y) {
    rect(x, y, 100, 100);
}
```



```
function a(value) {
    b(value);
}

function b(x, y) {
    rect(x, y, 100, 100);
}
```

ERROR: rect() was expecting Number for parameter #1 (zero-based index), received an empty variable instead.

LESSON: Match the number of arguments to the number of parameters.

5

arc

`arc(x, y, w, h, start, stop, [mode])`

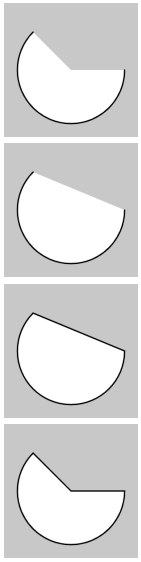
Draws an arc based on an ellipse with center `x,y` and width `w` and height `h`, starting at angle `start` and ending at angle `stop`. Angles are in radians.

Optional mode values used to fill the arc:

`OPEN`	open semi-circle
`CHORD`	closed semi-circle
`PIE`	close pie segment

Examples (shown at right, in order) – from p5.js reference:

```
arc(50, 50, 80, 80, 0, PI + QUARTER_PI);
arc(50, 50, 80, 80, 0, PI + QUARTER_PI, OPEN);
arc(50, 50, 80, 80, 0, PI + QUARTER_PI, CHORD);
arc(50, 50, 80, 80, 0, PI + QUARTER_PI, PIE);
```



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Owls (McCarthy, Reas, Fry)

```
function setup() {
    createCanvas(480, 120);
}
function draw() {
    background(204);
    // Left owl
    translate(110, 110);
    stroke(0);
    strokeWeight(70);
    // Body:
    line(0, -35, 0, -65);
    noStroke();
    fill(255);
    // Left eye dome:
    ellipse(-17.5, -65, 35, 35);
    // Right eye dome:
    ellipse(17.5, -65, 35, 35);
    // Chin:
    arc(0, -65, 70, 70, 0, PI);
    fill(0);
    // Left eye:
    ellipse(-14, -65, 8, 8);
    // Right eye:
    ellipse(14, -65, 8, 8);
    // Beak:
    quad(0, -58, 4, -51, 0, -44,
         -4, -51);
    // cont'd on next slide
```

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Owls (McCarthy, Reas, Fry) - continued

```
    // Right owl
    translate(70, 0);
    stroke(0);
    strokeWeight(70);
    // Body:
    line(0, -35, 0, -65);
    noStroke();
    fill(255);
    // Left eye dome:
    ellipse(-17.5, -65, 35, 35);
    // Right eye dome:
    ellipse(17.5, -65, 35, 35);
    // Chin:
    arc(0, -65, 70, 70, 0, PI);
    fill(0);
    // Left eye:
    ellipse(-14, -65, 8, 8);
    // Right eye:
    ellipse(14, -65, 8, 8);
    // Beak:
    quad(0, -58, 4, -51, 0, -44,
         -4, -51);
}
```

The only thing different between the two owls is the `translate` function.

8

Owls with a function (comments omitted)

```
function setup() {
    createCanvas(480, 120);
}
function draw() {
    background(204);
    owl(110, 110);
    owl(180, 110);
}
function owl(x, y) {
    push();
    translate(x, y);
    stroke(0);
    strokeWeight(70);
    line(0, -35, 0, -65);
    noStroke();
    fill(255);
    ellipse(-17.5, -65, 35, 35);
    ellipse(17.5, -65, 35, 35);
    arc(0, -65, 70, 70, 0, PI);
    fill(0);
    ellipse(-14, -65, 8, 8);
    ellipse(14, -65, 8, 8);
    quad(0, -58, 4, -51, 0, -44,
         -4, -51);
    pop();
}
```

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Lots of Owls!

```
function setup() {
    createCanvas(480, 120);
}
function draw() {
    background(204);
    for (var x = 35; x < width + 70; x += 70)
    {
        owl(x, 110);
    }
}
function owl(x, y) {
    // same as last slide
}
```

10

Functions calling Functions

```
function setup() {
    createCanvas(600, 400);
}

function draw() {
    background(150, 200, 150);
    house(mouseX + 25, mouseY);
    house(mouseX - 225, mouseY);
}

function house(x, y) {
    rect(x + 20, y, 160, 100);
    roof(x, y);
    door(x, y);
    windowpane(x, y);
}
```

```
function roof(x, y) {
    triangle(x, y, x + 100,
             y - 50, x + 200, y);
}

function door(x, y) {
    rect(x + 100, y + 30, 30, 70);
}

function windowpane(x, y) {
    rect(x + 50, y + 30, 30, 30);
}
```

We didn't call this function `window` since that is already a name of a function in p5.js!

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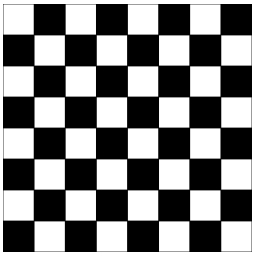
Chess Board with a function



```
var grayvalue = 255;
function setup() { createCanvas(320, 320); }
function draw() {
    rectMode(CORNER);
    for (var row = 0; row < 8; row += 1) {
        drawRow(row);
    }
}
function drawRow(r) {
    for (var c = 0; c < 8; c += 1) {    // r=row  c=column
        fill( ((r+c) % 2) * 255 );
        rect(c*40, r*40, 40, 40);
    }
}
```

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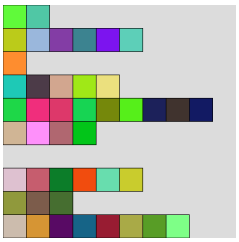
Color Bars with a function

```
var side = 40;
...
function draw() {
    for (var row = 0; row < 10; row += 1) {
        var limit = floor(random(0,11));
        drawRow(row, limit);
    }
    noLoop();   // stop animation
}
function drawRow(r, numSqrs) {
    for (var c = 0; c < numSqrs; c += 1) {
        fill(random(0,256), random(0,256), random(0,256));
            rect(c*side, r*side, side, side);
        }
}
```



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