

15-104 Introduction to Computing for Creative Practice

Fall 2021

03 Variables and a little bit of Logic

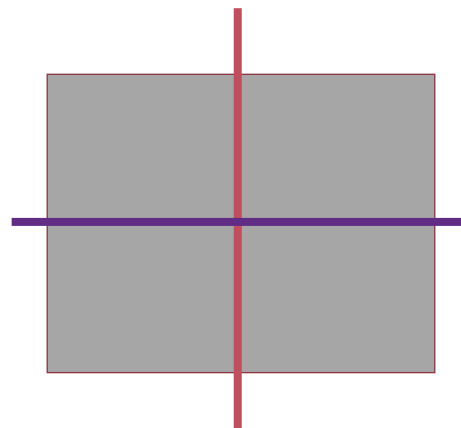
Instructor: Tom Cortina, tcortina@cs.cmu.edu, GHC 4117, 412-268-3514

1




Four quadrants

```
function draw() {
  if (mouseX < width/2) {
    if (mouseY < height/2) {
      background(255,0,0); // red
    } else {
      background(0,255,0); // green
    }
  } else {
    if (mouseY < height/2) {
      background(0,0,255); // blue
    } else {
      background(0,0,0); // black
    }
  }
}
```



2




Logical AND &&

```
function draw() {
  if (mouseX < width/2 && mouseY < height/2) {
    background(255,0,0); // red
  } else if (mouseX < width/2 && mouseY >= height/2) {
    background(0,255,0); // green
  } else if (mouseX > width/2 && mouseY < height/2) {
    background(0,0,255); // blue
  } else {
    background(0,0,0); // black
  }
}
```

Logical AND (&&): Both conditions must be true for the whole condition to be true.

3



Variables

- A variable is a container that holds some data value.
- We use variables in program statements to use that data value to perform a computation.
- p5.js has some variables that are predefined in the language to mean something: `mouseX`, `mouseY`, `width`, `height`, `mouseIsPressed`
- Variables in p5.js have implicit data types. (e.g. number, Boolean)

4

We can define our own variables

- Global variables – defined before the setup function (i.e. not inside any specific function)
 - Pro: Accessible throughout the entire program
 - Con: Any part of the program could modify the variable, making it harder to debug
- Local variables – defined within a function
 - Pro: Only one function can access and modify the variable, making it easier to debug
 - Con: Not accessible by other functions, but we can pass the value in a variable into another function using a parameter

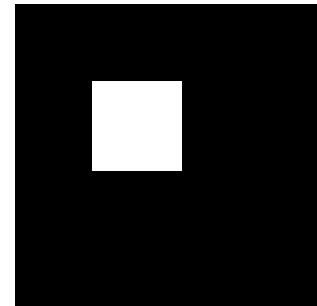
5

Example

We declare a variable using the keyword `var`.

Here, the `=` operator does not mean equality. Instead, it means **assignment** (i.e. Assign the variable `boxWidth` the value of 60. Symbolically: `boxWidth ← 60`)

```
var boxWidth = 60;
function setup() {
  createCanvas(200, 200);
}
function draw() {
  background(0);
  rect(50, 50, boxWidth, boxWidth);
}
```



6



Modifying variables

- Within our code, we can modify variables.
- Example: As soon as the mouse crosses to the right half, double the box width.

```
function draw() {
  background(0);
  if (mouseX > width / 2) {
    boxWidth = 120;
  }
  rect(50, 50, boxWidth, boxWidth);
}
```

7




Motion

```
var boxWidth = 60;
var boxX = 50;
function setup() {
  createCanvas(200, 200);
}
function draw() {
  background(0);
  boxX = boxX + 1;
  rect(boxX, 50, boxWidth, boxWidth);
}
```

← What does this line do?


8



Modify draw so box reappears

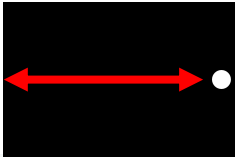
```
function draw() {
  background(0);
  if (boxX > width) {
    boxX = -boxWidth;
  }
  boxX = boxX + 1;
  rect(boxX, 50, boxWidth, boxWidth);
}
```

9




A tennis match

```
var x = 300;
var dir = 1;
var speed = 5;
function setup() {
  createCanvas(600, 400);
}
// cont'd in next column
```



```
function draw() {
  background(0);
  ellipse(x, height/2, 50, 50);
  x += dir * speed;
  if (x > width - 25) {
    dir = -dir;
  }
  if (x < 25) {
    dir = -dir;
  }
}
```

10



Logical OR ||

```


var x = 300;
var dir = 1;
var speed = 5;
function setup() {
  createCanvas(600, 400);
}
// cont'd in next column

function draw() {
  background(0);
  ellipse(x, height/2, 50, 50);
  x += dir * speed;
  if (x > width - 25 || x < 25) {
    dir = -dir;
  }
}

```

Logical OR (||): Only one condition needs to be true for the whole condition to be true.

11



Expanding and Contracting

```

var dir = 1;
var speed = 5;
var diam = 50;
function setup() {
  createCanvas(600, 400);
}
function draw() {
  background(0);
  ellipse(width/2, height/2,
    diam, diam);
  diam += dir * speed;
  if (diam > 400) {
    dir = -dir;
    diam = 400;
  } else if (diam < 0) {
    dir = -dir;
    diam = 0;
  }
}

```

12



Try these:

- Make the circle have separate horizontal and vertical speeds and have it bounce off of each of the four sides of the canvas.
- Have the white circle expand until it completely fills the canvas. Then have a black circle expand until it completely fills the canvas. Repeat forever.