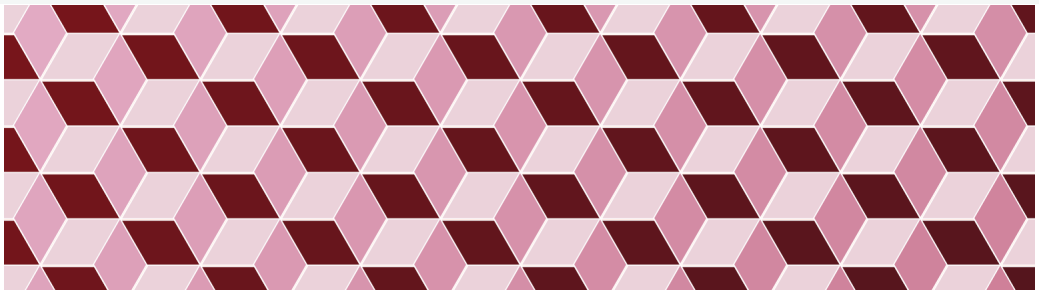

15-104 Introduction to Computing for Creative Practice

Fall 2021

05 Interaction

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dist

- Function that calculates and returns the distance between two points. (can also do three dimensions later)
- `dist(x1, y1, x2, y2)`
  Parameters:
  `x1` Number: x-coordinate of the first point
  `y1` Number: y-coordinate of the first point
  `x2` Number: x-coordinate of the second point
  `y2` Number: y-coordinate of the second point
- Example:
  `dist(0, 0, 30, 40)` returns `50`

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Faulty example

```
var x = 150;
var y = 100;
var d = 25;
var g = 0;


function setup() {
    createCanvas(300, 200);
}
```

```
function draw() {
    if (mouseIsPressed) {
        if (dist(mouseX,
         mouseY, x, y) < d/2) {
            g += 32;
        }
    }
    print(g.toString());
    background(g);
    ellipse(x, y, d, d);
}
```

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Improved Example

```
var x = 150;
var y = 100;
var d = 25;
var g = 0;


function setup() {
    createCanvas(300, 200);
}
```

How does this behaves differently?

```
function draw() {
    print(g.toString());
    background(g);
    ellipse(x, y, d, d);
}
function mousePressed() {
    if (dist(mouseX, mouseY,
             x, y) < d/2) {
        g += 32;
    }
}
```

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`mouseIsPressed` vs. `mousePressed()`

- `mouseIsPressed` is a Boolean value
- `mousePressed()` is a function

- `mouseIsPressed` is true as long as the mouse is pressed down
- `mousePressed()` is called at the moment when the mouse is pressed down

- Can you now explain the behavior of both of these examples?
- NOTE: Open the console while you run the program to see the value of `g` as the program runs.

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Data Types

- *Number* in Javascript is an approximation of a real number in math. Real numbers include things like pi, 7.0, 11/7, and 1.1. We say approximation because numbers in Javascript have finite precision: about 12 digits. However, integers (up to about 16 decimal digits, no fractional component) are represented exactly.
  - Literal numbers are written as decimal integers (1776), with decimal points (98.6), or scientific notation (1.23e-10, which means 1.23×10^{-10}).

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Data Types (cont'd)

- *Boolean* in Javascript is `true` or `false`.
  Boolean values result from relational operators
  (e.g. `4 < 5` has the Boolean value of `true`)
  or logical combinations of Boolean values
  (e.g. `true || false` has the Boolean value of `true`).
  - Operators `&&`, `||`, == and === return Boolean values.
    === compares for "true" equality: same value, same type
    == compares for loosely equal values, but false == 0, and "10" == 10
  - In an if statement with a condition that is a Number, any not-zero number is interpreted to mean true.

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Detecting mouse buttons

```
function setup() {
    createCanvas(120, 120);
    strokeWeight(30);
}

function draw() {
    background(204);
    stroke(102);
    line(40, 0, 70, height);
    // cont'd in next column
}
```

```
if (mouseIsPressed) {
    if (mouseButton == LEFT)
    {
        stroke(255);
    } else {
        stroke(0);
    }
    line(0, 70, width, 50);
}
```

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Detecting Mouse Buttons

- `mouseButton` can have three values:
  `LEFT`
  `CENTER`
  `RIGHT`
- Set based on whatever button was pressed most recently.
- Different browsers may track `mouseButton` differently.
- On Macs, right click is usually done by holding down the control key while you click.

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What does this program do?

```
var x;
var offset = 10;

function setup() {
    createCanvas(240, 120);
    x = width / 2;
}

function draw() {
    background(204);
    if (mouseX > x) {
        x += 0.5;
        offset = -10;
    }
    // cont'd in next column
```

```
    if (mouseX < x) {
        x -= 0.5;
        offset = 10;
    }
    line(x, 0, x, height);
    line(mouseX, mouseY,
         mouseX + offset,
         mouseY - 10);
    line(mouseX, mouseY,
         mouseX + offset,
         mouseY + 10);
    line(mouseX, mouseY,
         mouseX + offset * 3,
         mouseY);
}
```

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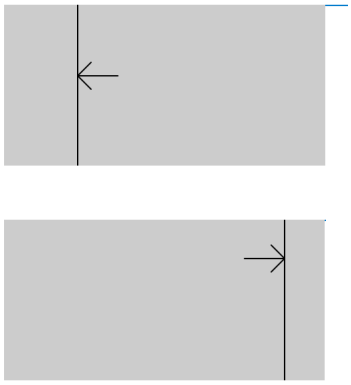
Chase The Arrow!



- How is `offset` used?
- What commands draw the arrow?
- What happens when:
  - `mouseX < x`?
  - `mouseX > x`?
  - `mouseX == x`?

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Another way to draw the arrows

```
var size = 10;
```

Then in the `draw` function:

```
line(x, 0, x, height); // vertical line at x
if (offset < 0) {      // arrow to the left
    line(mouseX, mouseY, mouseX - size, mouseY - size);
    line(mouseX, mouseY, mouseX - size, mouseY + size);
    line(mouseX, mouseY, mouseX - size * 3, mouseY);
} else { // arrow to the right
    line(mouseX, mouseY, mouseX + size, mouseY - size);
    line(mouseX, mouseY, mouseX + size, mouseY + size);
    line(mouseX, mouseY, mouseX + size * 3, mouseY);
}
```

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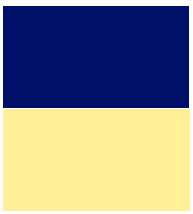
Color Flip (Boolean flag/toggle)



```
var on = false;
var r = 255;
var g = 240;
var b = 151;

function setup() {
  createCanvas(300, 200);
}
function draw() {
  if (on == true) {
    background(r, g, b );
  } else {
    background(255-r, 255-g, 255-b);
  }
}
function mousePressed() {
  if (on == true) {
    on = false;
  } else {
    on = true;
  }
}
```

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Boolean shortcuts

```
function draw() {
  if (on == true) {
    background(r, g, b );
  } else {
    background(255-r, 255-g, 255-b);
  }
}
```

```
function draw() {
  if (on) {
    background(r, g, b );
  } else {
    background(255-r, 255-g, 255-b);
  }
}
```

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Boolean shortcuts

```
function draw() {
  if (on == false) {
    background(255-r, 255-g, 255-b);
  } else {
    background(r, g, b);
  }
}
```

```
function draw() {
  if (!on) {
    background(255-r, 255-g, 255-b);
  } else {
    background(r, g, b);
  }
}
```

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Boolean shortcuts

```
function mousePressed() {
  if (on) {
    on = false;
  } else {
    on = true;
  }
}
```

```
function mousePressed() {
  if (!on) {
    on = true;
  } else {
    on = false;
  }
}
```

```
function mousePressed() {
   on = !on;
}
```

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Try this:

- `pmouseX` and `pmouseY` store the position of the mouse from the previous frame.
- Write a p5.js program that allows you to "write" on the canvas by drawing a line from the previous mouse position to the current one, over and over as the user moves the mouse along the canvas.
- Update the program so that when the mouse is clicked, the canvas is erased and the user can draw on a fresh canvas.

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