imc

js p5*

# introduction to media computing
week 03

School of creative media, mw

# Today's topics (week 03)

- **operators & conditionals**
  - review
  - the modulo operator `'%'`
- **logical operators**
- **coding style**
- **loops I: `while()` loop**

# Today's topics (week 03)

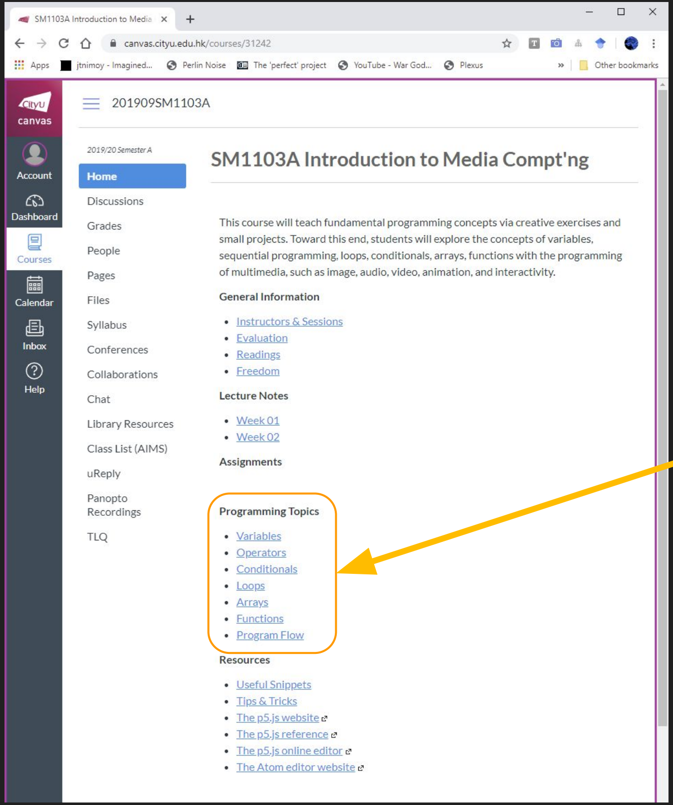
js

- operators & conditionals
  - review
  - the modulo operator `'%'`
- logical operators
- coding style
- loops I: `while()` loop

p5*

- p5.js online editor
- drawing text
- mouse click

# Resources for review



SM1103A Introduction to Media

canvas.cityu.edu.hk/courses/31242

201909SM1103A

2019/20 Semester A

## SM1103A Introduction to Media Compt'ng

This course will teach fundamental programming concepts via creative exercises and small projects. Toward this end, students will explore the concepts of variables, sequential programming, loops, conditionals, arrays, functions with the programming of multimedia, such as image, audio, video, animation, and interactivity.

**General Information**

- Instructors & Sessions
- Evaluation
- Readings
- Freedom

**Lecture Notes**

- Week 01
- Week 02

**Assignments**

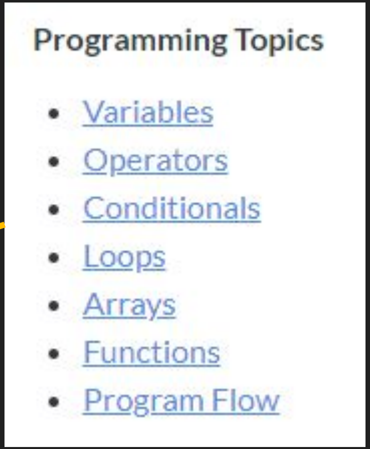
**Programming Topics**

- Variables
- Operators
- Conditionals
- Loops
- Arrays
- Functions
- Program Flow

**Resources**

- Useful Snippets
- Tips & Tricks
- The p5.js website
- The p5.js reference
- The p5.js online editor
- The Atom editor website

https://canvas.cityu.edu.hk/courses/31242



**Programming Topics**

- Variables
- Operators
- Conditionals
- Loops
- Arrays
- Functions
- Program Flow

## Review: math. operators

```
let a = 10;
let b = 6;
let result;


result = a + b;
result = a - b;
result = a * b;
result = a / b;
result = a % b;
```

| | |
|---|---|
| addition | `result = 16` |
| subtraction | `result = 4` |
| multiplication | `result = 60` |
| division | `result = 1.6667` |
| modulo | `result = 4`* |

*Remainder of integer division

## Review: assignment operators

```
let r;
r = 10;
r = r + 1;
r += 2;
r -= 2;
r *= 2;
r /= 2;
r %= 2;
```

| | | |
|---|---|---|
| assignment | `r = 11` | `(10 + 1)` |
| add. assignment | `r = 13` | `(11 + 2)` |
| sub. assignment | `r = 11` | `(13 - 2)` |
| mul. assignment | `r = 22` | `(11 * 2)` |
| div. assignment | `r = 11` | `(22 / 2)` |
| mod. assignment | `r = 1` | `(11 % 2)`* |

*Remainder of integer division

js

## Review: other operators

```
let x = 200;
x++;
```

'++' : increment

`x++` is equivalent to `x = x + 1`

```
let x = 200;
x--;
```

'--' : decrement

`x--` is equivalent to `x = x - 1`

## Review: if else

```
if (x == 200) {
    //  Do something
}
else if (x < 200) {
    //  Do something
}
else {
    //  Do something else
}
```

**Only ONE block of code will be executed.**

js

## Review: relational operators

```
if (x >= 200) {
    //  Do something
}
else {
    //  Do something else
}
```

| operators | meaning |
|---|---|
| > | larger than |
| < | smaller than |
| >= | larger or equal to |
| <= | small or equal to |
| != | not equal to |
| == | equal to |

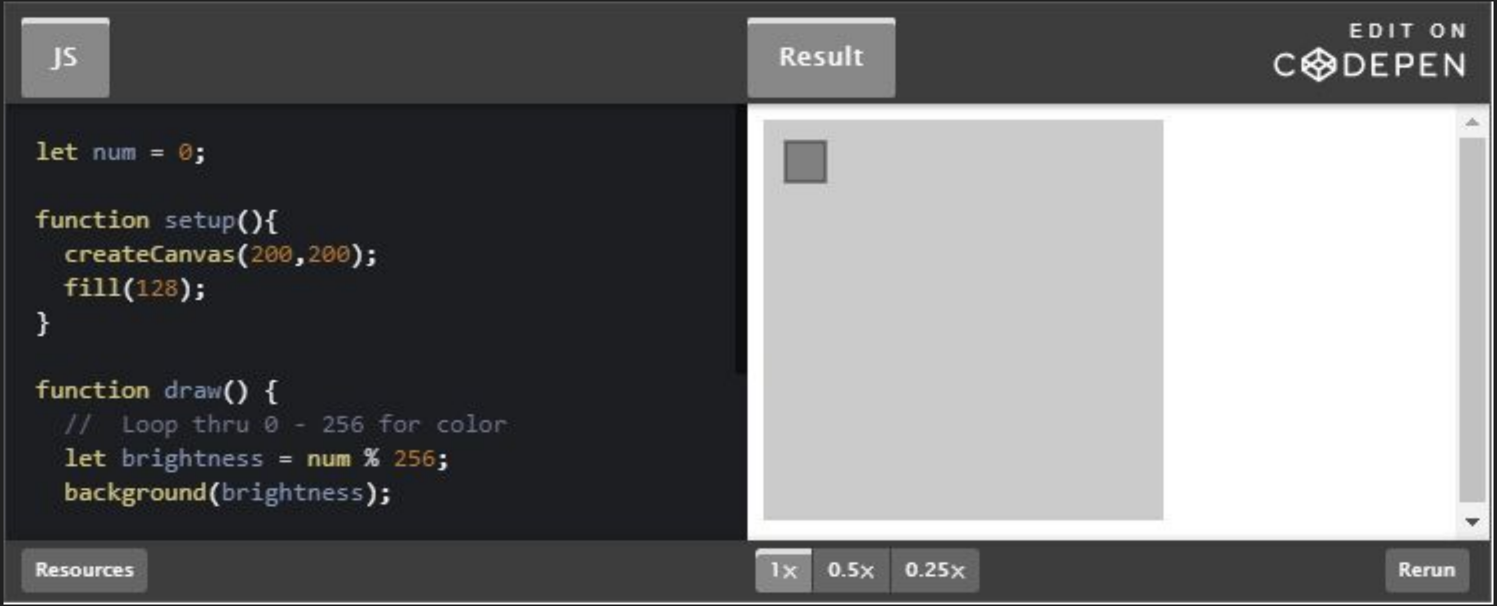
## Modulo Operator '%'

## Modulo Operator '%'

- modulo operator '%' computes the remainder of an integer division. Example: `5 % 2` returns 1.

- This operator is particularly useful for some simple looping operation.

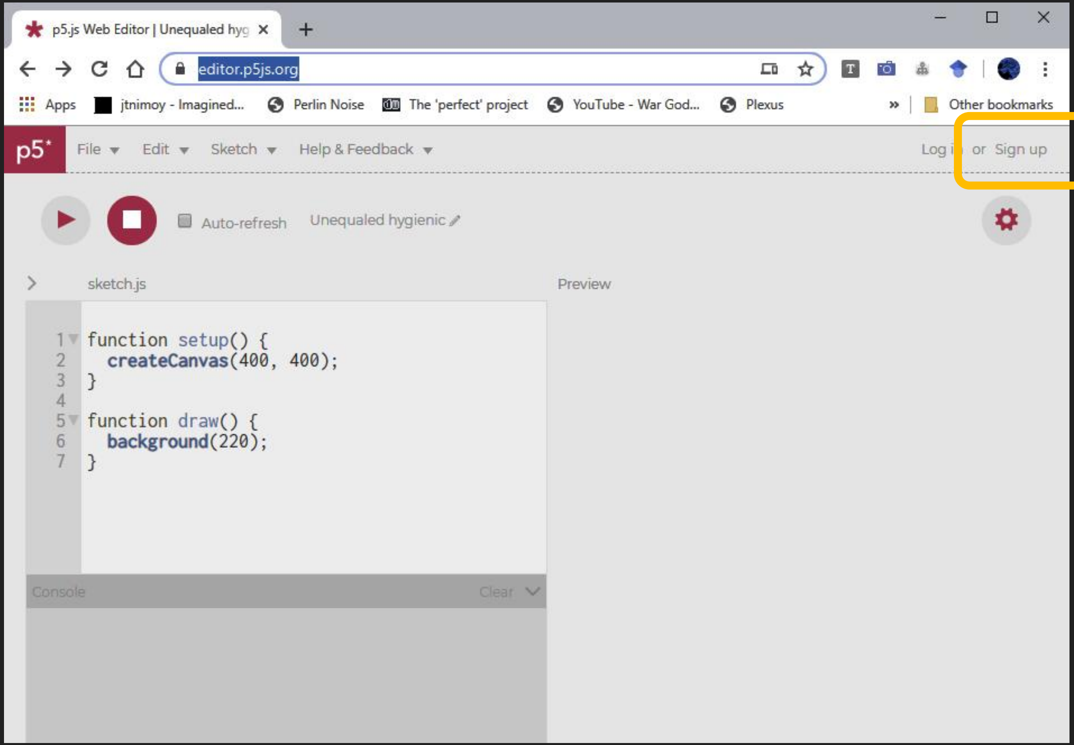
## Modulo Operator '%'



```
let num = 0;

function setup(){
  createCanvas(200,200);
  fill(128);
}

function draw() {
  //  Loop thru 0 - 256 for color
  let brightness = num % 256;
  background(brightness);
```

## p5.js online editor

## p5.js online editor

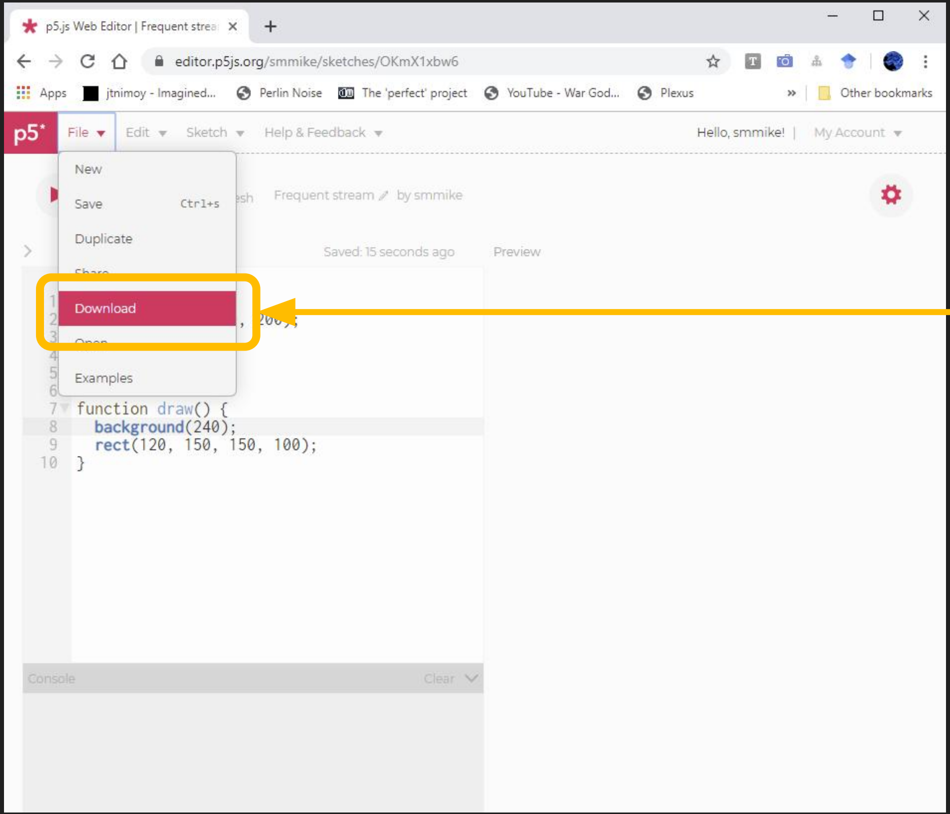


```
function setup() {
  createCanvas(400, 400);
}

function draw() {
  background(220);
}
```

**Please follow the URL and create an account so you can save your sketches, then do the exercise on the next slide.**

https://editor.p5js.org/

# p5.js online editor



```
function draw() {
  background(240);
  rect(120, 150, 150, 100);
}
```

Once you have saved your sketch, you may download the sketch as a zipped archive.

## Logical Operators

## Logical operators

- logical operator helps us to compose more flexible 'conditions' for various JavaScript conditionals.
- All 'conditions' evaluation in JavaScript returns a logical (boolean) value `'true'` or `'false'`.

```
if (x == 200) {
    // Do something
}
```

Simple SINGLE condition, what if we want to combine two or more conditions ?

## Logical operators

| operators | meaning |
|---|---|
| `\|\|` | Logical OR |
| `&&` | Logical AND |
| `!` | Logical NOT |

```
if (x == 0 || x == 200 ) {
    //  Do something
}
```

**This block will run only if**

**X equals to 0**

**OR**

**X equals to 200**

## Logical operators

| operators | meaning |
|---|---|
| `\|\|` | Logical OR |
| `&&` | Logical AND |
| `!` | Logical NOT |

```
if (x > 1 && x != 200) {
    // Do something
}
```

This block will run only if
X is larger than 1
AND
X is not equal to 200

## Logical operators

| operators | meaning |
|---|---|
| `||` | `Logical OR` |
| `&&` | `Logical AND` |
| `!` | `Logical NOT` |

```
if (!(x > 1)) {
    // Do something
}
```

**The NOT operator always inverses the result of the condition (x > 1). So the block runs when x does not fulfill (x > 1), i.e. the block runs when x is NOT larger than 1.**

## Truth table

Logical OR '||'

| A | B | (A \|\| B) |
|---|---|---|
| true | true | true |
| true | false | true |
| false | true | true |
| false | false | false |

Logical AND '&&'

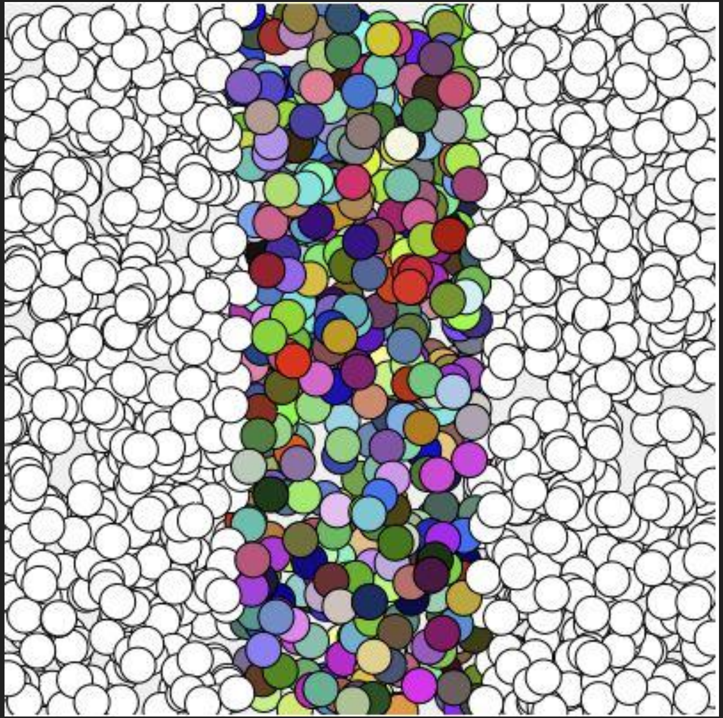
| A | B | (A && B) |
|---|---|---|
| true | true | true |
| true | false | false |
| false | true | false |
| false | false | false |

Logical NOT '!'

| A | !(A) |
|---|---|
| true | false |
| false | true |

exercise

# In-class exercise 2



1. Fill the canvas (400 x 400) with circles of size 20, each with a random position.

2. Divide the screen into 3 regions as shown in the figure. Circles in the middle region are randomly colored, and the rest are in white.

3. Use <u>only one conditional</u>. Hint: Use a ' logical operator '.

js

## Coding Style

## Coding Style

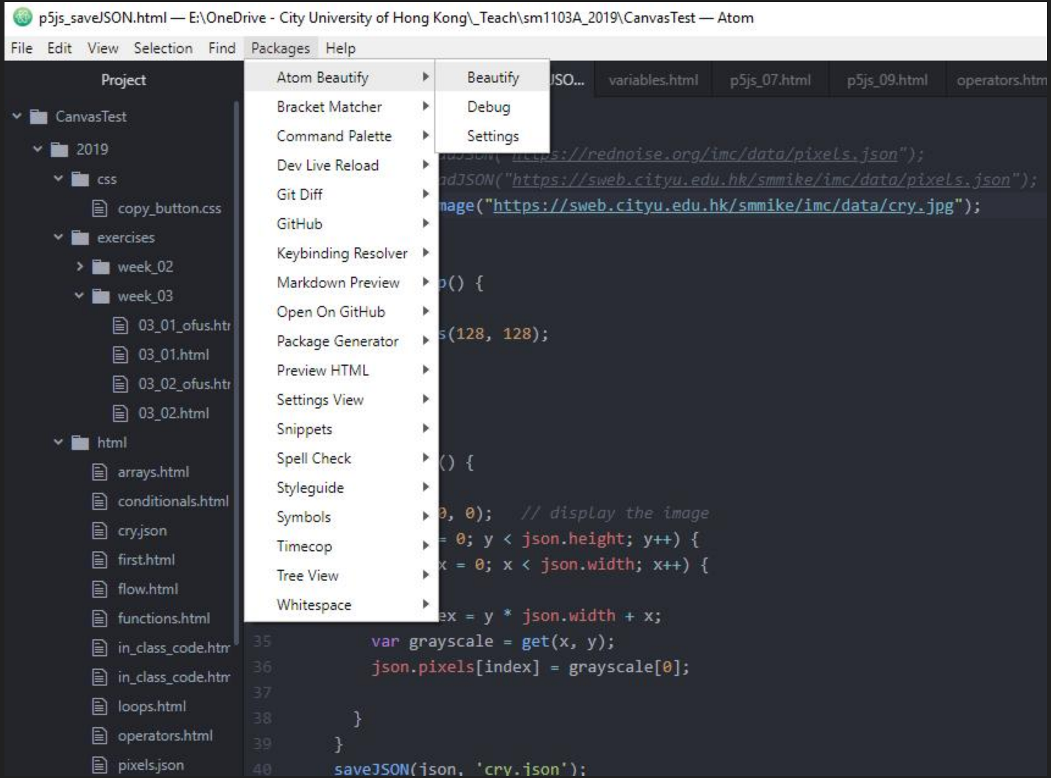
```
let x=0;

function setup() {
  createCanvas(400, 400);
  background(220);
}

function draw() {
  if (x % 2 == 1) {
    fill(150);
  } else {
    fill(0);
  }
  ellipse(50 * x, 0, 50, 200);
  x++;
}
```

It is VERY IMPORTANT to use proper indentation and spacing in your code.

WHY ?

- Easier for you to read
- Easier for others to read
- Help you to spot mistakes
- It shows you understand *the craft of coding*
-

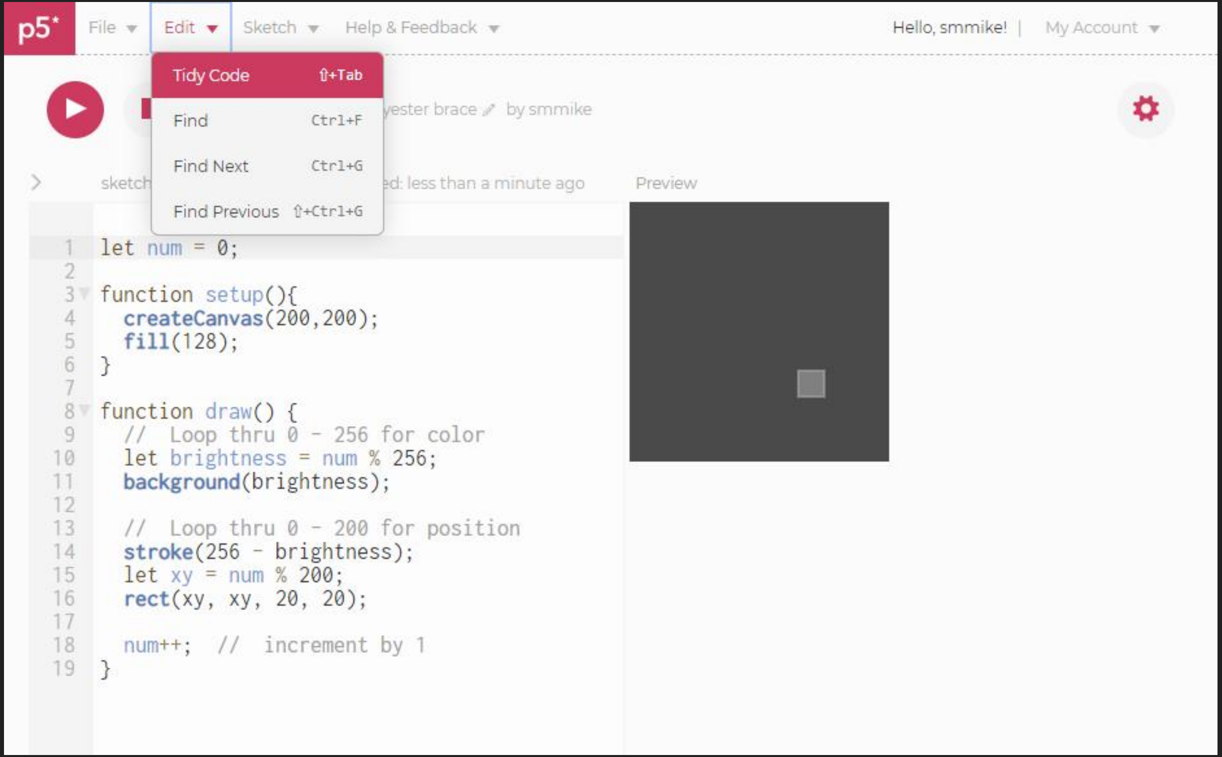
# Coding Style



```
adJSON("https://rednoise.org/imc/data/pixels.json");
adJSON("https://sweb.cityu.edu.hk/smmike/imc/data/pixels.json");
mage("https://sweb.cityu.edu.hk/smmike/imc/data/cry.jpg");

p() {

s(128, 128);

() {

0, 0);   // display the image
= 0; y < json.height; y++) {
x = 0; x < json.width; x++) {

ex = y * json.width + x;
      var grayscale = get(x, y);
      json.pixels[index] = grayscale[0];

    }
  }
  saveJSON(json, 'cry.json');
```

Most modern code editor like Atom often has code 'beautify' or 'prettify' package which helps with code formatting and syntax highlighting.

# Coding Style



```
let num = 0;

function setup(){
  createCanvas(200,200);
  fill(128);
}

function draw() {
  //  Loop thru 0 - 256 for color
  let brightness = num % 256;
  background(brightness);

  //  Loop thru 0 - 200 for position
  stroke(256 - brightness);
  let xy = num % 200;
  rect(xy, xy, 20, 20);

  num++;  //  increment by 1
}
```

p5.js editor also offers convenient code formatting functions.

## Coding Style

**Properly formatted code is required in all assignments. Poorly formatted code will lead to point deduction.**

js

## Loops 1: The `'while()'` loop

## Loops 1: the `while()` loop

js

- A 'Loop' allows a block of code to be executed repeatedly (a.k.a. iteration).

- A `while()` loop repeats a block of code to as long as certain condition is fulfilled in each iteration.

## Loops 1: the while() loop

js

The simple while() loop below repeats drawing a rectangle as long as the value of variable x is less than 3.

```
let x = 0;
while ( x < 3 ) {
  rect( x, 0, 10, 10);
  x = x + 1;
}
```

## Loops 1: the `while()` loop

```
while ( <condition> ) {
   // code run multiple times;
}
```

`while()` loop repeats the block of code as long as the condition is being fulfilled, i.e. the condition is verified in each iteration.

```
if ( <condition> ) {
   // code run ONCE only;
}
```

`if()` runs the block of code if the condition is fulfilled and it only runs once.

## Loops 1: the `while()` loop

It is **VERY IMPORTANT** to note that the block of code inside a `while()` loop should always do something to fail the condition by design.

```
let x = 0;
while ( x < 3 ) {
  rect( x, 0, 10, 10);
  // x = x + 1;
}
```

**INFINITE LOOP**
It never stops !!

## Loops 1: the `while()` loop

```
while (x < 10) {
  // some code here;
}
```

```
while (x != 10 && y == 1) {
  // some code here;
}
```

The `<condition>` is written in similar fashion as in if-else and other conditionals.

try p5*

## Loops 1: the `while()` loop

Try the following code inside `function setup()`

of a sketch using the p5.js editor

```
let x = 5;
while (x > 0) {
   text(x, x * 12, 20);
   x--;
}
```

```
let y = 0;
while (y < 5) {
   text(y, 20, y * 12);
   y++;
}
```

p5*

## `text()` drawing and `mouseIsPressed`

# `text()` drawing

- `text("hi",x,y)` draws numbers or text at a given coordinate on the canvas.
- `textSize(size)` defines the size of text to be drawn.
- Colors of the text to be drawn, like most shapes are controlled by `fill()` and `stroke()`.

## `text()` drawing

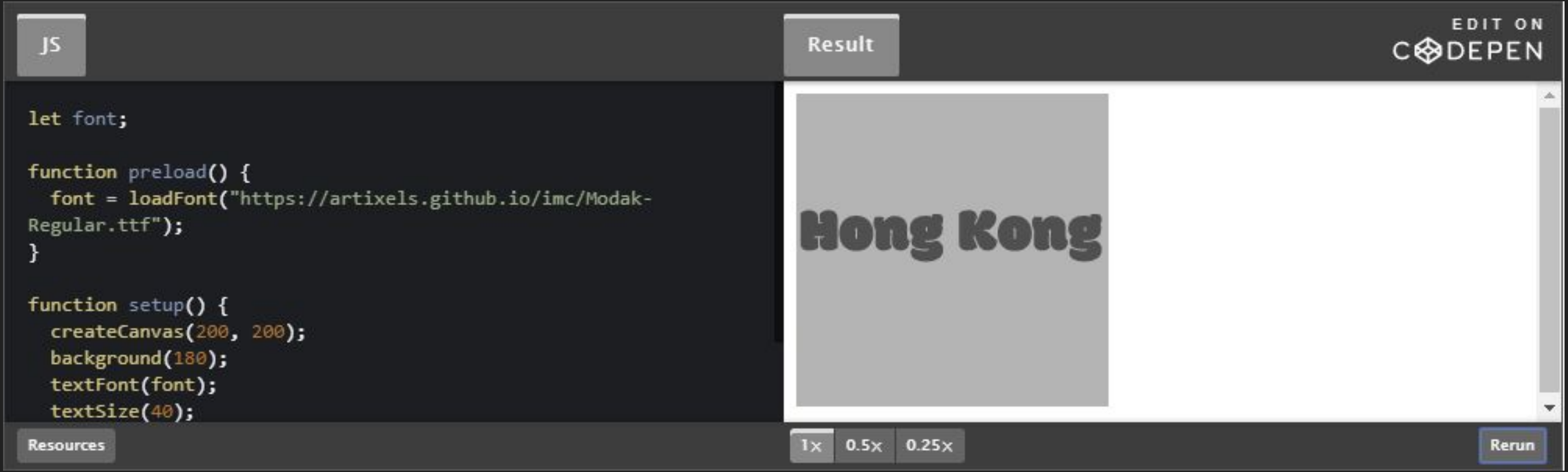
- `loadFont(URL)` loads a font file from the given URL or a local file. `loadFont(URL)` should be called within the `function preload()` block of p5.js.
- `textFont(font)` tells P5.js what font to be used for the text to be drawn by `text()`

## Built-in variable `mouseIsPressed`

`mouseIsPressed` is a p5.js built-in boolean variable (stores `true` or `false`) that you may use for detecting if the mouse is being pressed. Use it with a `if(){}` statement and execute your desired instructions when the mouse is pressed. (use it in `function draw()` block)

```
if (mouseIsPressed) {
    //  Draw or Do something
}
```

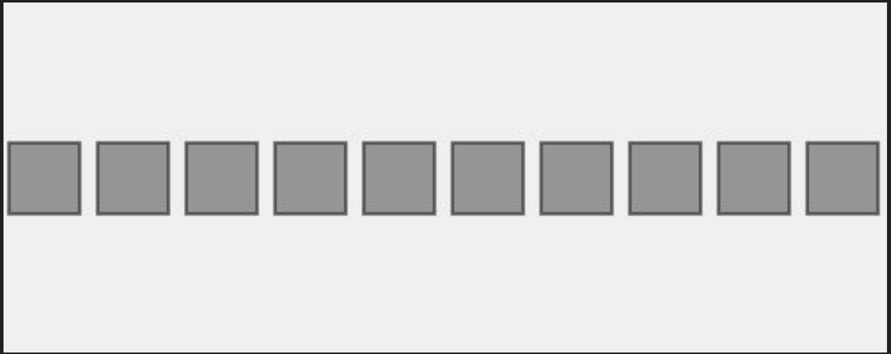
## text() and mouseIsPressed

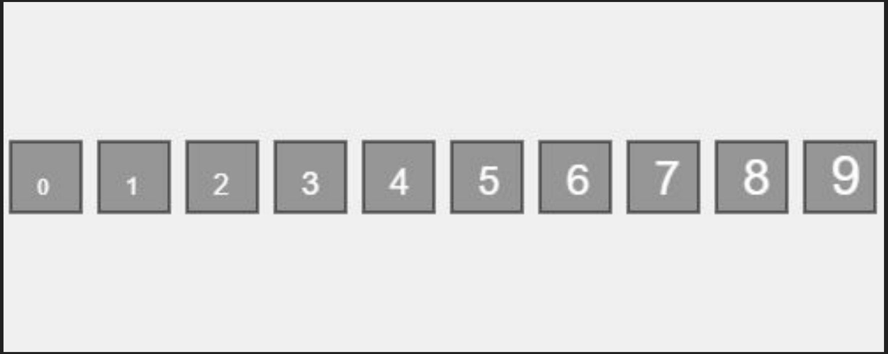


```
let font;

function preload() {
  font = loadFont("https://artixels.github.io/imc/Modak-
Regular.ttf");
}

function setup() {
  createCanvas(200, 200);
  background(180);
  textFont(font);
  textSize(40);
```

exercise

## In-class exercise 3





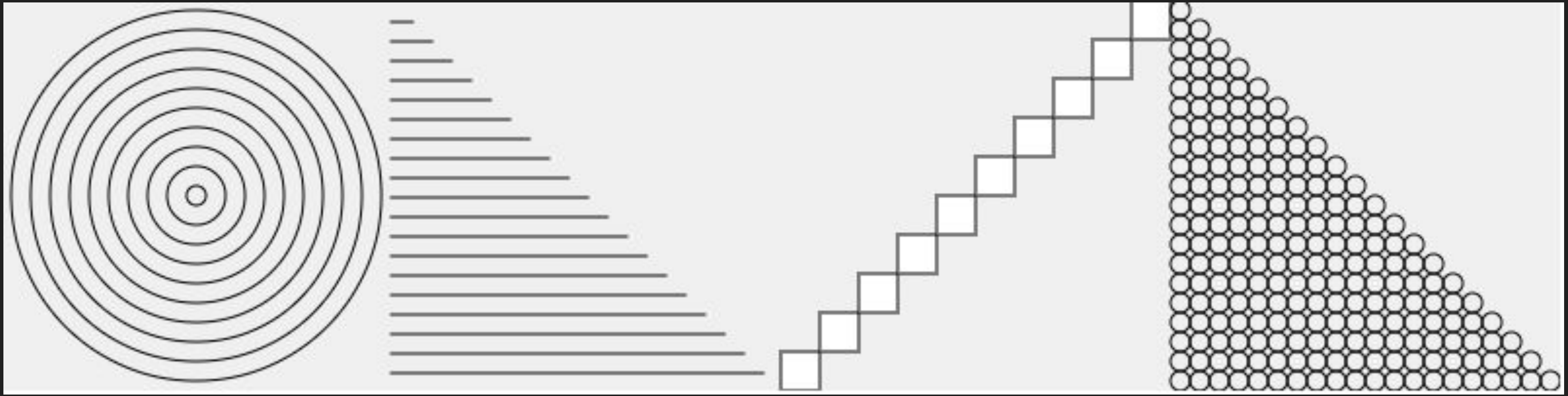
1. Add your code to `function setup()`, not `function draw()`. Use a `while()` loop to draw 10 gray squares across a 500 x 200 canvas, exactly as shown.

2. Add the numbers as shown to your squares.

exercise

## In-class exercise 4

Try your best to reproduce the following 4 drawings as close as possible using `while()` loop. The left 3 should only take one single `while()` loop, and the right-most one may take more than one loop.



Assignment #1 has been released on our Canvas page this Monday (Sept. 16).

Please study the specification carefully

## Due Date

## Sept. 30 (Mon), 23:59.