Interaction

Function Definition
Events
Built-in Variables

Chapter 5, Examples 5-1, 5-2, 5-3, 5-4, 5.5, 5-6.

Which image is drawn by this code?
Calling Functions

- Code that is “packaged” so it can be run “by name”
- Often performs some computation and returns a value (but not always)
- We call functions all the time in JavaScript ...

```javascript
noFill();
ellipse(75, 50, 23, 52);
```

Function Declaration

tell JavaScript “declare a function”

```javascript
function setup() {
  createCanvas(100, 100);
  background(200);
  fill(255, 0, 0); // red
  ellipse(50, 50, 30, 30);
}
```
function setup() { }

function draw() { }

Built-in variables:
mouseX, mouseY

Try background in draw() or setup()

https://editor.p5js.org/cs105/sketches/7wuklY_bg

(demos: errors)
calling functions “outside” a function block
wrong function definitions
Trace of setup and draw

- see: “04 Interaction (trace).pdf”

Sequential Control Flow

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

```
function draw() {
    ellipse(mouseX, mouseY, 30, 30);
}
```
print() to trace program flow
(using frameCount, frameRate too)

function setup() {
    createCanvas(200, 200);
    frameRate(1); // set to 1 frame per second
    print("setup");
}

function draw() {
    background(230); // almost white
    fill(255, 0, 0); // red
    ellipse(mouseX, mouseY, 30, 30);
    print("draw frame " + frameCount);
}
Event

1. An observable occurrence, phenomenon, or an extraordinary occurrence.
2. A message to notify an application that something happened.

- Examples:
  - Keyboard (key press, key release)
  - Mouse Events (button press, button release, moved)
Setup and Draw are Events

- The setup event happens when the program is first run
  - setup() is a built-in function that represents this event
  - Processing calls setup() when the setup event occurs
- The draw event happens 60 times per second (by default)
  - draw() is a built-in function that represents this event
  - Processing calls draw() when the draw event occurs
- We “customize” setup() and draw() functions to do something when these events occur

Trace Through: setup() and draw()

```javascript
// red dot
1 function setup() {
2     createCanvas(200, 200);
3     noStroke();
4     fill(255, 0, 0); // red
5 }

6 function draw() {
7     background(240); // almost white
8     ellipse(mouseX, mouseY, 30, 30);
9 }
```
Trace Through: setup() and draw()

```javascript
// red dot

function setup() {
  createCanvas(200, 200);
  noStroke();
  fill(255, 0, 0); // red
}

function draw() {
  background(240); // almost white
  ellipse(mouseX, mouseY, 30, 30);
}
```

**mousePressed Event**

- A mousePressed event happens when a mouse button is pressed (or a touch pad tapped)
  - `mousePressed()` is a built-in function that represents this event
  - Processing calls `mousePressed()` when the event occurs
- We define a `mousePressed()` function to “customize” it to do something when this event occurs
- (there’s also a mouseReleased event and corresponding function)

```java
function mousePressed() {
    ...
}
```

**keyPressed Event**

- A keyPressed event happens when a key is pressed
  - `keyPressed()` is a built-in function that represents this event
  - Processing calls `keyPressed()` when the event occurs
- We define a `keyPressed()` function to “customize” it to do something when this event occurs
- (there’s also a keyReleased() event and corresponding function)

```java
function keyPressed() {
    ...
}
```
Which image is drawn by this code ...

```javascript
function setup() {
  createCanvas(100, 100);
  background(255);
}

function draw() {
  rect(25, 25, 50, 50);
}

function mousePressed() {
  fill(0); // black
  ellipse(50, 50, 25, 25);
}
```

https://editor.p5js.org/cs105/sketches/hOVVeyZ0h
Variables

- A symbolic name used to reference an “unknown” value. The value may change, but the symbolic name doesn’t.

- Kinds of Variables
  - built-in variables (e.g. mouseX, width)
  - constants (CENTER, BEVEL)
  - user defined variables (next class!)

Useful Processing Built-in Variables

width, height
frameCount

mouseX, mouseY
pmouseX, pmouseY
mouseIsPressed
mouseButton

keyIsPressed
key, keycode
function draw() {
  background(255);
  line(width / 2, height / 2,
       mouseX, mouseY);
}

function draw() {
  background(255);
  line(mouseX - 25, mouseY - 25,
       mouseX + 25, mouseY + 25);
}
Using built-in variables in expressions

Exercises:

Start from hi drawing:
https://editor.p5js.org/cs105/sketches/uYIgbdkp5

1. Make “hi” follow the mouse

2. Make “hi” follow the mouse (with the mouse cursor always at the top point of the “h”)